United Nations

FCCC/IDR.7/EU

Framework Convention on Climate Change

Distr.: General

17 August 2018

English only

Report on the technical review of the seventh national communication of the European Union

Parties included in Annex I to the Convention were requested by decision 9/CP.16 to submit their seventh national communication to the secretariat by 1 January 2018. According to decision 15/CMP.1, Parties included in Annex I to the Convention that are also Parties to the Kyoto Protocol are required to include in their national communications supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. This report presents the results of the technical review of the seventh national communication and relevant supplementary information under the Kyoto Protocol of the European Union, conducted by an expert review team in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention" and the "Guidelines for review under Article 8 of the Kyoto Protocol".

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Abbreviations and acronyms

AEA	annual emission allocation
BR	biennial report
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CTF	common tabular format
EEA	European Environment Agency
ERT	expert review team
ESD	effort-sharing decision
ETC/ACM	European Topic Centre on Air Pollution and Climate Change Mitigation
EU	European Union
EU CAP	European Union Common Agricultural Policy
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
GDP	gross domestic product
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
ICAO	International Civil Aviation Organization
IE	included elsewhere
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
JRC	Joint Research Centre
LULUCF	land use, land-use change and forestry
MMR	monitoring mechanism regulation
NA	not applicable
NC	national communication
NE	not estimated
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
non-Annex I Party	Party not included in Annex I to the Convention
non-ETS sectors	sectors not covered by the European Union Emissions Trading System
N_2O	nitrous oxide
PaMs	policies and measures
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
reporting guidelines for supplementary information	"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol, Part II: Reporting of supplementary information under Article 7, paragraph 2"
SF_6	sulfur hexafluoride

UNFCCC reporting guidelines on BRs	"UNFCCC biennial reporting guidelines for developed country Parties"
UNFCCC reporting guidelines on NCs	"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications"
WAM	'with additional measures'
WEM	'with measures'

I. Introduction and summary

A. Introduction

1. This is a report on the in-country technical review of the NC7 of the EU. The review was coordinated by the secretariat in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention", particularly "Part V: UNFCCC guidelines for the technical review of national communications from Parties included in Annex I to the Convention" (annex to decision 13/CP.20), and the "Guidelines for review under Article 8 of the Kyoto Protocol" (annex to decision 22/CMP.1 and annex I to decision 4/CMP.11).[1]

2. In accordance with the same decisions, a draft version of this report was transmitted to the EU, which provided comments that were considered and incorporated with revisions into this final version of the report.

3. The review was conducted from 5 to 9 March 2018 in Brussels by the following team of nominated experts from the UNFCCC roster of experts: Mr. Marko Aunedi (Croatia), Ms. Eglantina Bruci (Albania), Ms. Baasansuren Jamsranjav (Mongolia), Mr. Tendayi Marowa (Zimbabwe) and Mr. Alexander Zahar (Australia). Ms. Bruci and Mr. Zahar were the lead reviewers. The review was coordinated by Ms. Katia Simeonova and Mr. Davor Vesligaj (UNFCCC secretariat).

B. Summary

4. The ERT conducted a technical review of the information reported in the NC7 of the EU in accordance with the UNFCCC reporting guidelines on NCs (decision 4/CP.5) and the reporting guidelines for supplementary information, in particular the supplementary information required under Article 7, paragraph 2, and on the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol (annex to decision 15/CMP.1 and annex III to decision 3/CMP.11).

1. Timeliness

5. The NC7 was submitted on 19 December 2017, before the deadline of 1 January 2018 mandated by decision 9/CP.16.

2. Completeness, transparency of reporting and adherence to the reporting guidelines

6. Issues and gaps identified by the ERT related to the reported information are presented in table 1. The information reported by the EU in its NC7, including the supplementary information under the Kyoto Protocol, mostly adheres to the UNFCCC reporting guidelines on NCs.

[1] At the time of the publication of this report, the EU had submitted its instrument of acceptance of the Doha Amendment; however, the amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, paragraph 6, pending the entry into force of the amendment.

Table 1

Assessment of completeness and transparency of mandatory information reported by the European Union in its seventh national communication, including supplementary information under the Kyoto Protocol

Section of NC	*Completeness*	*Transparency*	*Reference to description of recommendations*	*Supplementary information under the Kyoto Protocol*	*Completeness*	*Transparency*	*Reference to description of recommendations*
Executive summary	Complete	Transparent		National system	Complete	Transparent	
National circumstances	Complete	Transparent		National registry	Mostly complete	Transparent	Issue 1 in table 5
GHG inventory	Complete	Transparent		Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Complete	Transparent	
PaMs	Mostly complete	Transparent	Issue 1 in table 8	PaMs in accordance with Article 2	Mostly complete	Transparent	Issue 4 in table 8
Projections and the total effect of PaMs	Mostly complete	Transparent	Issue 1 in table 12	Domestic and regional programmes and/or arrangements and procedures	Mostly complete	Transparent	Issues 1 and 2 in table 6
Vulnerability assessment, climate change impacts and adaptation measures	Complete	Transparent		Information under Article 10[a]	Complete	Transparent	
Financial resources and transfer of technology	Complete	Transparent		Financial resources	Complete	Transparent	
Research and systematic observation	Complete	Transparent		Minimization of adverse impacts in accordance with Article 3, paragraph 14	Complete	Transparent	
Education, training and public awareness	Complete	Transparent					

Note: A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in chapter III below.

[a] The assessment refers to information provided by the Party on the provisions contained in Article 4, paragraphs 3, 5 and 7, of the Convention reported under Article 10 of the Kyoto Protocol, which is relevant to Parties included in Annex II to the Convention only. Assessment of the information provided by the Party on the other provisions of Article 10 of the Kyoto Protocol is provided under the relevant substantive headings under the Convention, for example research and systematic observation.

3. Summary of reviewed supplementary information under the Kyoto Protocol

7. The supplementary information under Article 7, paragraph 2, of the Kyoto Protocol is incorporated in different sections of the NC7, and the supplementary information under Article 7, paragraph 1, of the Kyoto Protocol is reported in the NIR of the 2017 annual submission. Table 2 provides references to where the information is reported. The technical assessment of the information reported under Article 7, paragraphs 1 and 2, of the Kyoto Protocol is contained in the relevant sections of this report.

Table 2
Overview of supplementary information under the Kyoto Protocol reported by the European Union

Supplementary information	*Reference to section of NC7*
National system	3.3
National registry	3.4
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	4.5.4.1, 4.5.4.2
PaMs in accordance with Article 2	4.5.4.3
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	4.5.3
Information under Article 10	3.3, 4.4, 6.4, 7.6, 8.2, 9.3, 9.9
Financial resources	7.2, 7.3, 7.4
Minimization of adverse impacts in accordance with Article 3, paragraph 14	Reported in the NIR of the Party's 2017 annual submission

II. Technical review of the information reported in the seventh national communication, including the supplementary information under the Kyoto Protocol

A. Information on national circumstances and greenhouse gas emissions and removals

1. National circumstances relevant to greenhouse gas emissions and removals

(a) Technical assessment of the reported information

8. In the national circumstances chapter of its NC7, the EU explained the relationship between its historic and future emission trends and the climate change policy development. The changing nature of its circumstances defines the factors that affect the climate policy development and has an impact on the implementation of the Convention. The NC7 contains key data on legislation, population trends, geography and land use, climate and climate change, economic developments, energy, transport, the buildings sector, industry, trade, the services sector, agriculture, forestry, resource efficiency and wastewater.

9. During the review, in response to a question raised by the ERT, the EU provided additional information elaborating on the key changes in the national circumstances since its NC6, such as the increasing dependence on imported fossil

fuels, and other relevant changes influenced by policies implemented at the EU level, such as the increasing share of electricity generation from renewables and the decrease in solid waste disposal to landfills with increased rates of recycling, composting and incineration of waste. The ERT noted that the EU could further enhance the transparency of the reported information by providing information on these and other relevant key changes in the national circumstances when preparing its next NC.

10. The ERT noted that during the period 1990–2015 the population and GDP of the EU increased by 6.6 and 52.7 per cent, respectively, while GHG emissions per capita and GHG emissions per GDP unit decreased by 28.4 and 50.0 per cent, respectively. In absolute terms, total GHG emissions without LULUCF decreased from 5,642,685 to 4,307,968 kt CO_2 eq between 1990 and 2015, which represents a 23.7 per cent reduction. The Party explained that decomposition analysis based on data from 1990 to 2015 indicates the decoupling of economic growth from GHG emissions, driven mainly by the increased decarbonization of the fuel supply mix due to the switch from coal to gas for electricity and heat generation, and PaMs aimed at a substantial increase in the use of renewable energy sources and improvements in energy efficiency (transformation and end use). The ERT welcomes the use of decomposition analysis, which helps to distinguish the impact on emissions of key drivers such as population and GDP growth from policy drivers, and considers this an example of best practice. Table 3 illustrates the national circumstances of the EU by providing some indicators relevant to emissions and removals.

Table 3
Indicators relevant to greenhouse gas emissions and removals for the European Union for the period 1990–2015

						Change (%)	
Indicator	*1990*	*2000*	*2010*	*2014*	*2015*	*1990–2015*	*2014–2015*
GDP per capita (thousands 2011 USD using purchasing power parity)	24.87	30.31	34.10	34.94	35.63	43.2	2.0
GHG emissions without LULUCF per capita (t CO_2 eq)	11.80	10.55	9.47	8.43	8.45	–28.4	0.2
GHG emissions without LULUCF per GDP unit (kg CO_2 eq per 2011 USD using purchasing power parity)	0.47	0.35	0.28	0.24	0.24	–50.0	–1.7

Sources: (1) GHG emission data: the EU's 2017 GHG inventory submission, version 2; (2) population and GDP: World Bank.

Note: The ratios per capita and per GDP unit are calculated relative to GHG emissions without LULUCF; the ratios are calculated using the exact (not rounded) values and may therefore differ from a ratio calculated with the rounded numbers provided in the table.

(b) Assessment of adherence to the reporting guidelines

11. The ERT assessed the information reported in the NC7 of the EU and recognized that the reporting on national circumstances relevant to GHG emissions and removals is complete, transparent and adhering to the UNFCCC reporting guidelines on *NCs. There were no issues raised* during the review relating to the topics discussed in this chapter of the review report.

2. Information on greenhouse gas inventory arrangements, emissions, removals and trends

(a) Technical assessment of the reported information

12. Total GHG emissions[2] excluding emissions and removals from LULUCF decreased by 23.7 per cent between 1990 and 2015, whereas total GHG emissions including net emissions or removals from LULUCF decreased by 26.0 per cent over the same period. Table 4 illustrates the emission trends by sector and by gas for the EU.

Table 4
Greenhouse gas emissions by sector and by gas for the European Union for the period 1990–2015

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2014*	*2015*	*1990–2015*	*2014–2015*	*1990*	*2015*
Sector									
1. Energy	4 336 581.58	4 004 540.22	3 789 987.05	3 328 575.35	3 357 969.82	-22.6	0.9	76.9	77.9
A1. Energy industries	1 679 561.37	1 509 125.38	1 445 209.92	1 254 265.88	1 242 009.08	-26.1	-1.0	29.8	28.8
A2. Manufacturing industries and construction	836 387.05	679 482.24	537 375.09	481 604.01	483 402.49	-42.2	0.4	14.8	11.2
A3. Transport	781 807.81	918 012.20	931 307.42	891 609.21	905 887.84	15.9	1.6	13.9	21.0
A4. and A5. Other	847 781.72	766 627.95	780 282.59	611 733.33	637 407.88	-24.8	4.2	15.0	14.8
B. Fugitive emissions from fuels	191 043.63	131 292.44	95 812.03	89 362.92	89 262.53	-53.3	-0.1	3.4	2.1
C. CO_2 transport and storage	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NA	NA	NA	NA
2. IPPU	516 886.29	452 490.84	390 007.58	378 030.51	373 937.41	-27.7	-1.1	9.2	8.7
3. Agriculture	548 269.51	464 472.12	425 548.98	433 853.16	436 748.31	-20.3	0.7	9.7	10.1
4. LULUCF	-231 763.20	-300 855.94	-320 231.10	-309 405.55	-304 854.82	31.5	-1.5	NA	NA
5. Waste	240 947.79	230 732.06	169 658.57	144 372.15	139 312.78	-42.2	-3.5	4.3	3.2
6. Other	NO	NO	NO	NO	NO	NA	NA	NA	NA
Indirect CO_2	4 394.60	2 707.55	2 012.36	1 646.91	1 661.88	-62.2	0.9	NA	NA
Gas[a]									
CO_2	4 457 424.17	4 162 645.82	3 930 649.49	3 468 722.54	3 498 051.30	-21.5	0.8	79.0	81.2
CH_4	728 408.46	606 472.00	492 177.63	458 434.26	456 014.30	-37.4	-0.5	12.9	10.6
N_2O	384 989.38	305 219.75	239 234.14	235 046.56	235 991.55	-38.7	0.4	6.8	5.5
HFCs	29 125.49	53 224.22	102 222.61	112 694.77	107 610.61	269.5	-4.5	0.5	2.5
PFCs	25 870.24	12 188.07	3 878.08	3 502.40	3 575.98	-86.2	2.1	0.5	0.1
SF_6	11 002.95	10 585.70	6 431.49	6 135.90	6 413.32	-41.7	4.5	0.2	0.1
NF_3	23.78	103.44	119.45	74.34	69.18	191.0	-6.9	0.0	0.0
Total GHG emissions without LULUCF	5 642 685.16	5 152 235.24	4 775 202.18	4 284 831.17	4 307 968.32	-23.7	0.5	100.0	100.0
Total GHG emissions with LULUCF	5 410 921.96	4 851 379.30	4 454 971.08	3 975 425.61	4 003 113.50	-26.0	0.7	NA	NA

[2] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified. Values in this paragraph were calculated on the basis of the EU's 2017 annual GHG inventory submission, version 2.

	GHG emissions (kt CO_2 eq)					Change (%)		Share (%)	
	1990	2000	2010	2014	2015	1990–2015	2014–2015	1990	2015
Total GHG emissions without LULUCF, including indirect CO_2	5 647 079.76	5 154 942.80	4 777 214.54	4 286 478.07	4 309 630.20	–23.7	0.5	100.0	100.0
Total GHG emissions with LULUCF, including indirect CO_2	5 415 316.56	4 854 086.85	4 456 983.44	3 977 072.52	4 004 775.38	–26.0	0.7	NA	NA

Source: GHG emission data: the EU's 2017 annual GHG inventory submission, version 2.
[a] Emissions by gas without LULUCF and without indirect CO_2.

13. The decrease in total emissions was driven mainly by factors such as the shift from coal to gas for electricity and heat production, the increased use of renewable energy sources, energy efficiency improvements, structural changes in the economy with reduced activity in the industrial sector and growth in the services sector, economic recession, changes in prevailing weather patterns, and policies at both the EU and member State level. These drivers also led to the decoupling of GDP and GHG emissions in the EU. The only major sector with increased emissions between 1990 and 2015 was the transport sector.

14. During the review, the ERT was provided with information from an approximated EU GHG emission inventory for 2016, published in October 2017, which suggested a continuation of the existing decreasing emission trend at the EU level, whereby GHG emissions in 2016 declined by 0.7 per cent compared with the 2015 level.

15. Between 1990 and 2015, GHG emissions from the energy sector decreased by 22.6 per cent (978,611.76 kt CO_2 eq), owing mainly to energy efficiency improvements (including improved thermal insulation of buildings and reduced energy intensity of GDP), the increased decarbonization of the fuel supply mix resulting from the fuel shift from coal to gas for electricity and heat production, and the increased use of renewable energy sources. There are nevertheless significant variations in trends within the energy sector, with transport emissions showing notable increases (15.9 per cent or 124,080.03 kt CO_2 eq higher in 2015 than in 1990), but emissions from energy use in other sectors showing a decreasing trend (31.0 per cent or 1,102,691.79 kt CO_2 eq lower in 2015 than in 1990).

16. Between 1990 and 2015, GHG emissions from IPPU decreased by 27.7 per cent (142,948.88 kt CO_2 eq), owing mainly to reduced levels of industrial activity as well as emission reduction measures taken in relation to the production of adipic acid, nitric acid and halocarbons. Between 1990 and 2015, GHG emissions from the agriculture sector decreased by 20.3 per cent (111,521.20 kt CO_2 eq), reflecting the reduction in the cattle population and the decreased use of fertilizer and manure on agricultural soils. The LULUCF sector was a net sink of 304,854.82 kt CO_2 eq in the EU in 2015; net GHG removals have increased by 73,091.62 kt CO_2 eq since 1990. Key drivers for this trend were the significant build-up of carbon stocks in forests, environmental policies that have resulted in less intensive agricultural practices, and an increase in forest and woodland conservation areas. Between 1990 and 2015, GHG emissions from the waste sector decreased by 42.2 per cent (101,635.01 kt CO_2 eq), primarily driven by EU policies such as the landfill waste directive.

17. The largest share of total GHG emissions on a CO_2 eq basis is associated with CO_2 (81.2 per cent in 2015). Between 1990 and 2015, CO_2 emissions decreased by 21.5 per cent (959,372.87 kt CO_2 eq), owing mainly to the reduced emissions from electricity and heat production resulting from improvements in energy efficiency, fossil fuel switching from coal to gas and the deployment of renewable energy. The effects of these drivers were partially offset by the increased CO_2 emissions from road transportation (20.0 per cent higher in 2015 than in 1990).

18. CH_4 emissions decreased by 37.4 per cent (272,394.16 kt CO_2 eq) between 1990 and 2015, primarily as a result of the reduced contribution from enteric fermentation driven by the EU CAP limiting cattle overproduction and of the reduced CH_4 emissions from waste disposal sites (by 47.3 per cent) thanks to increased recycling and incineration. Emissions of N_2O over the same period decreased by 38.7 per cent (148,997.83 kt CO_2 eq), mainly as a result of lower emissions from managed soils (a reduction of 16.2 per cent) and the decreased use of fertilizers, but the reduction was offset by the 30.9 per cent increase in N_2O emissions from road transportation due to higher demand for transport and the increased share of diesel vehicles.

19. Emissions of F-gases (HFCs, PFCs, SF_6 and NF_3) increased by 78.2 per cent (51,646.63 kt CO_2 eq) between 1990 and 2015, dominated by increased HFC emissions resulting from the use of HFCs in refrigeration and air conditioning as a replacement for chlorofluorocarbons. Since 2014 there has been a decrease in HFC emissions by 4.5 per cent, and this trend is expected to continue as the effects of the new F-gas legislation become apparent.

20. The summary information provided on GHG emissions was consistent with the information reported in the 2017 annual submission.

(b) Assessment of adherence to the reporting guidelines

21. The ERT assessed the information reported in the NC7 of the EU and recognized that the reporting of GHG inventory information is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

3. National system for the estimation of anthropogenic emissions by sources and removals by sinks

(a) Technical assessment of the reported information

22. The EU provided in the NC7 a description of how its national system for the estimation of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol is performing the general and specific functions defined in the annex to decision 19/CMP.1. The description includes all the elements mandated by paragraph 30 of the annex to decision 15/CMP.1. The NC7 also contains a reference to the description of the national system provided in the NIR of the 2017 annual submission.

23. The national inventory arrangements of the EU were established in accordance with the EU MMR (525/2013). In addition, Commission delegated regulation (EU) 666/2014 established the substantive requirements for the EU national system. A

Commission staff working document[3] describes the elements of the EU inventory system in more detail.

24. The Directorate-General for Climate Action of the European Commission has overall responsibility for the GHG inventory of the EU. The main stakeholders involved in the compilation of the EU GHG inventory are the member States, the Directorate-General for Climate Action, EEA and its ETC/ACM, Eurostat and the JRC. No changes have occurred in the arrangements of the national system since the NC6.

(b) Assessment of adherence to the reporting guidelines

25. The ERT assessed the information reported in the NC7 of the EU and recognized that the reporting on the national system is complete and transparent. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

4. National registry

(a) Technical assessment of the reported information

26. In the NC7 the EU provided information on how its national registry performs the functions in accordance with the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and complies with the requirements of the technical standards for data exchange between registry systems. The ERT took note of the review of the changes to the national registry reflected in the report on the individual review of the 2017 annual submission of the EU.

(b) Assessment of adherence to the reporting guidelines

27. The ERT assessed the information reported in the NC7 of the EU and identified an issue relating to completeness. The finding is described in table 5.

Table 5

Findings on the national registry from the review of the seventh national communication of the European Union

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation*
1	Reporting requirement specified in paragraph 32 Issue type: completeness Assessment: recommendation	The NC7 of the EU did not include the name and contact information of the registry administrator designated by the Party to maintain the national registry, or a description of the procedures employed in the national registry to minimize discrepancies in the issuance, transfer, acquisition, cancellation and retirement of emission reduction units, certified emission reductions, temporary certified emission reductions, long-term certified emission reductions, assigned amount units and/or removal units, and the replacement of temporary certified emission reductions and long-term certified emission reductions, or of the steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transactions. During the review, the EU provided the ERT with the above information. The Party explained that Article 102 of Commission regulation 389/2013 obliges the central administrator of the EU Kyoto Protocol registry to implement check input codes and check response codes to ensure the correct

[3] Available at https://ec.europa.eu/clima/sites/clima/files/strategies/progress/monitoring/docs/swd_2013_308_en.pdf.

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation
		interpretation of information exchanges during each process. The check codes are implemented in line with the data exchange standards and this functionality is tested with the UNFCCC on a regular basis. The ERT reiterates the recommendation made in the previous review report that the EU include these reporting elements in its next NC.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the reporting guidelines for supplementary information. The reporting on the requirements not included in this table is considered to be complete and transparent.

B. Information on policies and measures and institutional arrangements

1. Domestic and regional programmes and/or legislative arrangements and procedures related to the Kyoto Protocol

(a) Technical assessment of the reported information

28. For the second commitment period of the Kyoto Protocol, from 2013 to 2020, the EU, its member States and Iceland committed to contributing to the joint EU effort to reduce GHG emissions by 20 per cent below the base-year level.

29. The MMR (see para. 23 above) provides the legal basis for monitoring and reporting progress towards achievement of the EU GHG emission targets. Under the MMR, the European Commission assesses and reports annually thereon, including in relation to the Kyoto Protocol target. The EU ETS and the ESD are, according to the EU 2020 climate and energy package, the two overarching PaMs that establish the framework and internal rules underpinning the implementation of the EU's obligations in the second commitment period of the Kyoto Protocol.

30. The European Parliament, the Council of the EU and the European Commission are the major climate policymaking bodies in the EU. The European Commission proposes policies, enforces legislation and implements policies. The policies proposed by the European Commission are approved, amended or rejected by the Council of the EU and the European Parliament and then implemented at the member State level.

31. The EU has legislative arrangements and administrative procedures in place to make information publicly accessible, such as those stipulated in the MMR, particularly related to the assessment of the costs and effects of national PaMs, GHG inventory information, GHG projections, and the use of auctioning revenue and project credits.

32. The NC7 did not include information on national legislative arrangements and administrative procedures in place that seek to ensure that the implementation of activities under Article 3, paragraph 3, forest management under Article 3, paragraph 4, and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and the sustainable use of natural resources. One of the reasons, as explained by the EU, is that such arrangements are usually reported by the individual EU member States.

33. During the review, the EU provided information on its biodiversity strategy through to 2020,[4] which aims to halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restore them as far as feasible, while

[4] See http://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm#stra.

stepping up the EU's contribution to averting global biodiversity loss. One of the targets of the strategy (target 3, action 12) states that member States will ensure that their forest management plans include relevant measures, including the maintenance of optimal levels of deadwood, measures to increase resilience to fires and specific measures for Natura 2000 forests, and ensuring that afforestation is in accordance with the Pan-European Operational Level Guidelines for Sustainable Forest Management,[5] particularly with regard to biodiversity and climate change adaptation.

(b) Assessment of adherence to the reporting guidelines

34. The ERT assessed the information reported in the NC7 of the EU and identified issues relating to completeness. The findings are described in table 6.

Table 6
Findings on domestic and regional programmes and/or legislative arrangements and procedures related to the Kyoto Protocol from the review of the seventh national communication of the European Union

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation*
1	Reporting requirement specified in paragraph 37 Issue type: completeness Assessment: recommendation	The NC7 did not include information on the description of any institutional arrangements or decision-making procedures that the EU has in place to coordinate activities relating to participation in the mechanisms under Articles 6, 12 and 17, of the Kyoto Protocol, including the participation of legal entities. During the review, the Party explained that the MMR defines the EU and member States' obligations in relation to the Convention and its Kyoto Protocol, and the Party provided information on the regulations relevant to participation in the mechanisms under the Kyoto Protocol. The ERT recommends that the EU include the required information, including the information provided during the review, in its next NC.
2	Reporting requirement specified in paragraph 38 Issue type: completeness Assessment: recommendation	The NC7 did not include information on national legislative arrangements and administrative procedures in place to ensure that the implementation of activities under Article 3, paragraph 3, forest management under Article 3, paragraph 4, and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and the sustainable use of natural resources. During the review, the Party provided information on its biodiversity strategy through to 2020, which contains specific targets related to biodiversity and the sustainable use of natural resources (see para. 33 above). The ERT reiterates the recommendation made in the previous review report that the EU provide the required information, including the information provided during the review, in its next NC.

Note: The paragraph number listed under reporting requirement refers to the relevant paragraph of the reporting guidelines for supplementary information. The reporting on the requirements not included in this table is considered to be complete and transparent.

2. Policies and measures, including those in accordance with Article 2 of the Kyoto Protocol

(a) Technical assessment of the reported information

35. The EU provided comprehensive and well-organized information on its package of PaMs implemented, adopted and planned by sector and by gas at the EU

[5] Available at https://www.pefc.org/images/stories/documents/pefc-technical/MCPFE-PEOLG.pdf.

level, in order to fulfil its commitments under the Convention and its Kyoto Protocol. The EU reported on its policy context and legal and institutional arrangements put in place to implement its commitments and monitor and evaluate the effectiveness of its PaMs. The ERT noted that national PaMs developed and implemented at the member State level are outside the scope of the EU's NC7.

36. The EU provided information on a set of PaMs that is to a large extent similar to that previously reported. However, the ERT noted that the EU reported on a number of new PaMs that were implemented or adopted or had been in the planning stage since the previous submission, which suggests that it is expanding the scope of and strengthening its overall climate and energy policy framework, including PaMs on heating and cooling, clean energy innovation, the circular economy, low-emission mobility, energy labelling, combined transport of goods, and eco-design requirements for different consumer products. The ERT noted that many of the new PaMs have been launched to contribute towards the EU's nationally determined contribution for the period 2021–2030, including the 2030 climate and energy framework.

37. There were no changes made since the previous submission to the institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress made towards its target.

38. The EU gave priority to implementing the PaMs that make the most significant contribution to its emission reduction efforts. It provided a reference to its NC6 for information on how it believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals in accordance with the objective of the Convention. In addition, the EU reported on how it periodically updates and strengthens its PaMs to increase its emission reductions and provided updates on the PaMs that have been discontinued since the previous submission.

39. The coordination and implementation of PaMs depends on the nature of the legal instruments that stipulate them and is divided between the European Commission and the EU member States. The main implementing agency is the European Commission and its Directorate-General for Climate Action, which proposes and enforces legislation and implements policies and the EU budget. Several types of legal act are applied in different ways in the member States: a regulation is a law that is applicable and binding in relation to all member States directly, a directive is a law that binds member States to achieve a particular objective and must usually be transposed into national law to become effective, and a decision is binding in its entirety.

40. The key overarching cross-sectoral policy in the EU is the 2020 climate and energy package, adopted in 2009, which includes the revised EU ETS directive,[6] the ESD[7] and the directives on renewable energy[8] and carbon capture and storage.[9] The package is complemented by two further legislative acts: the regulation on the 2020

[6] Directive 2009/29/EC amending directive 2003/87/EC.

[7] Decision 406/2009/EC.

[8] Directive 2009/28/EC.

[9] Directive 2009/31/EC.

targets for CO_2 emissions from cars [10] and the directive on fuel quality. [11] The regulation on the 2020 targets for CO_2 emissions from vans was adopted in 2011 [12] and the energy efficiency directive in 2012. [13] These legislative acts are crucial for attaining the EU-wide emission reduction target by 2020 and are supplemented by two general programmes for environmental conservation, namely the 7th Environment Action Programme and the clean air policy package.

41. The EU ETS is a cap-and-trade system that operates in all of the 28 EU member States as well as in three non-EU countries (Iceland, Liechtenstein and Norway). It covers approximately 11,000 energy-intensive installations (mainly large point emissions sources such as thermal power plants, oil refineries and industrial facilities), which produce between 40–45 per cent of the total GHG emissions of the EU. It is expected that the EU ETS 2020 target (a 21 per cent emission reduction below the 2005 level) will be achieved for the sectors covered. The third phase of the EU ETS started in 2013. Aviation activities were included in 2012, and the EU ETS now includes slightly over 500 aircraft operators flying within the European Economic Area in addition to stationary installations. Moreover, in addition to CO_2 emissions, the EU ETS in its third phase covers N_2O emissions from certain chemical industries (all nitric, adipic and glyoxylic acid production) and PFC emissions from aluminium production.

42. The ESD became operational in 2013 and covers sectors outside the EU ETS, including transport (excluding domestic and international aviation, and international maritime transport), residential and commercial buildings, agriculture and waste, together accounting for approximately 55–60 per cent of the total GHG emissions of the EU. The aim of the ESD is to decrease GHG emissions in the EU by 10 per cent below the 2005 level by 2020 and it includes binding annual targets for each member State for 2013–2020.

43. The ERT noted that the EU is committed to spending at least 20 per cent of its budget for 2014–2020 on climate-related actions, amounting to approximately EUR 200 billion. In practice this means integrating climate considerations into all main spending areas of the EU budget, such as the development of regions, the EU CAP and research and development. Specific finance instruments include the Horizon 2020 funding for research and innovation, the European Fund for Strategic Investments, and LIFE Climate Action. Also, under the EU ETS, the EU established one of the largest funding programmes, NER 300, for innovative large-scale low-carbon demonstration projects, with overall funding of around EUR 2.1 billion. So far, 39 projects have been selected, mostly in the areas of wind energy, bioenergy and energy efficiency.

44. During the review, the ERT was provided with information on the 2030 climate and energy framework, which builds upon the EU 2020 climate and energy package and is in line with the EU's road map for moving to a competitive low-carbon economy by 2050, its Energy Roadmap 2050 and the EU white paper on transport. The framework sets three targets to be achieved by 2030: at least a 40 per cent reduction of GHG emissions from the 1990 level, which is fully in accordance

[10] Regulation (EC) 443/2009.

[11] Directive 2009/30/EC.

[12] Regulation (EC) 510/2011.

[13] Directive 2012/27/EU.

with the EU's nationally determined contribution under the Paris Agreement; at least a 27 per cent share of EU energy consumption to come from renewable energy sources; and at least a 27 per cent improvement in energy efficiency. Critical for the achievement of the 2030 targets is a set of legislative proposals for the revision of the EU ETS in its fourth phase, the effort-sharing regulation and the governance of the Energy Union. Table 7 provides a summary of the reported information on the PaMs of the EU.

Table 7
Summary of information on policies and measures reported by the European Union

Sector	*Key PaMs*	*Estimate of mitigation impact by 2020 (kt CO_2 eq)*	*Estimate of mitigation impact by 2030 (kt CO_2 eq)*
Policy framework and cross-sectoral measures	2020 climate and energy package (2009)	NE	NE
	EU ETS (2005)	NE	NE
	ESD (2013)	NE	NE
	2030 climate and energy framework	NE	NE
Energy	Energy Union strategy (2015)	NE	NE
Transport	Regulation on CO_2 emissions from cars (2009)	NE	NE
	Fuel quality directive (2009)	48 000	NE
	Regulation on CO_2 emissions from vans (2011)	NE	NE
Renewable energy	Renewable energy directive (2009)	NE	NE
Energy efficiency	Energy efficiency directive (2012)	NE	NE
	Energy performance of buildings directive (2012)	185 000	NE
	Energy labelling regulation (2017)	NE	NE
IPPU	F-gas regulation (2014)	NE	72 000
	Mobile air-conditioning systems directive (2006)	13 000	NE
	Industrial emissions directive (2011)	NE	NE
Agriculture	EU CAP	NE	NE
	Rural development policy (an EU CAP pillar)	NE	NE
	Nitrates directive (1991)	NE	NE
	Soil thematic strategy (2006)	NE	NE
LULUCF	LULUCF accounting decision (2013)	NE	NE
Waste	Landfill directive (1999)	44 000	NE
	Waste framework directive (2008)	40 100	NE

Note: The estimates of mitigation impact are estimates of emissions of CO_2 or CO_2 eq avoided in a given year as a result of the implementation of mitigation actions, unless otherwise specified.

(b) Policies and measures in the energy sector

45. The energy sector contributed 77.9 per cent of the total GHG emissions of the EU in 2015. Total emissions from the sector decreased by 22.5 per cent from 1990

to 2015, from 4,341 Mt CO_2 eq to 3,362 Mt CO_2 eq. The main reasons for the decrease are the fuel shift from coal to natural gas for electricity and heat production, the increased deployment of renewable energy sources and improvements in energy efficiency.

46. With the energy sector being its largest sectoral source of emissions, the EU has put in place a comprehensive climate and energy framework to mitigate emissions from the sector. The EU ETS is the key cross-sectoral PaM in the energy sector and it is complemented by PaMs to increase the use of renewable energy, increase energy efficiency and decrease transport emissions.

47. **Energy supply**. In 2015, final energy consumption in the EU was approximately 0.03 per cent lower than in 1990. From 1990 to 2015 there was a decrease of 40 per cent in the consumption of carbon-intensive coal and lignite, and of 11 per cent in the consumption of oil. At the same time, there was an increase of over 20 per cent in the consumption of gas. Oil currently accounts for the largest share of fossil fuel consumption in the EU (47 per cent), followed by natural gas (30 per cent) and solid fuels (22 per cent). The majority of the oil and gas consumed is imported (up to 55 per cent of primary energy supply). In 2015, power was generated by coal, oil and lignite (in total 26 per cent), nuclear processes (31 per cent) and natural gas (17 per cent).

48. The share of renewable energy sources has increased by more than 300 per cent since 1990, and in 2015 they accounted for approximately 30 per cent of total power generation. Total power production has increased because of increased demand for electricity. While the fuel mix for power generation has become less carbon intensive because of the substitution of coal for natural gas and enhancements in energy efficiency and renewable energy use, this was partially offset by an overall rise in electricity production of approximately 25 per cent between 1990 and 2015.

49. The most important PaM in the energy supply sector is the EU ETS, which covers large point emissions sources such as thermal power plants and oil refineries. Security of energy supply and the decarbonization of the economy are mutually reinforcing dimensions of the Energy Union strategy,[14] with an emphasis on the completion of the internal energy market and the diversification of energy sources, suppliers and routes. The energy taxation directive[15] aims to be consistent in the treatment of electricity and energy products by providing common taxation rules and a common minimum level of taxation in the EU.

50. **Renewable energy sources**. The share of gross energy consumption from renewables has increased since 1990 to around 13 per cent in 2015 in the EU. Electricity production from renewables almost tripled in that period and now accounts for 30 per cent of generation compared with 13 per cent in 1990. Large increases have occurred in generation from wind power and solar photovoltaics, with significant growth as well in solar thermal, biomass and geothermal energy production. Energy production from hydropower, tidal, wave and ocean technologies has remained constant. Two thirds of renewable energy consumed is renewable heat (from solar, biomass, geothermal and waste). Hydropower is the second largest, providing about 14 per cent of total renewable energy in 2015, with wind power in

[14] See https://eur-lex.europa.eu/resource.html?uri=cellar:1bd46c90-bdd4-11e4-bbe1-01aa75ed71a1.0001.03/DOC_1&format=PDF.

[15] Directive 2003/96/EC.

third place, contributing 12 per cent. Consumption of energy produced from solar photovoltaics has also grown substantially, with output almost 8,000 times higher in 2015 than in 1990, and the share of this source increasing from 0.002 per cent of renewable energy consumed in 1990 to 4.2 per cent in 2015.

51. The EU has set a legally binding target of at least a 20 per cent share of energy from renewable sources in the EU's gross final energy consumption in 2020. The target has been translated into legally binding national renewable energy targets for member States. The targets are implemented through cross-sectoral and sector-specific PaMs, including the climate and energy package and the renewable energy directive, which also includes sustainability criteria for biofuels. National renewable energy action plans have been prepared by the EU member States and contain measures and sectoral targets for reaching their legally binding national renewable energy targets.

52. The EU has reported that it is on track to meet its renewable energy target, with the share of energy from renewable sources in the EU's gross final energy consumption having reached 16.7 per cent in 2015. The EU 2030 energy and climate framework aims to further increase use of renewable energy to at least 27 per cent by 2030. In this regard, the European Commission made a proposal for a revised directive on the promotion of the use of energy from renewable sources in 2016.

53. **Energy efficiency**. A strategic target of the EU, as part of the 2020 climate and energy package, is a 20 per cent improvement in energy efficiency by 2020, which translates into indicative national energy efficiency targets for each member State. The target is reinforced by cross-sectoral and sector-specific PaMs (see table 7). Illustrative PaMs include the dozens of eco-design requirements already in place in the EU for household and office electrical goods and other products.

54. The EU is on track to meet its target of a 20 per cent improvement in energy efficiency by 2020. In 2015, primary energy consumption in the EU was 3.2 per cent above the 2020 primary energy consumption target. The EU 2030 climate and energy framework target is to improve energy efficiency by at least 27 per cent.

55. **Residential and commercial sectors**. The heating and cooling of buildings accounts for a significant portion of energy consumption in the EU and has one of the highest potentials for improved energy efficiency. Measures to reduce the space heating/cooling demand in buildings represent a significant part of this potential. Many of the measures (e.g. improved insulation) are highly cost-effective, but a number of barriers to their implementation exist, for example high cost of initial investment.

56. The PaMs in the residential and commercial sectors aim to enhance the energy efficiency of the building stock. This is to be accomplished by implementing general and sector-specific energy performance policies such as the ESD and introducing energy-efficient solutions for existing building stock and new house construction through the sector-specific energy performance of buildings directive. In the longer term, a proposed amendment to the energy performance of buildings directive includes provisions to help achieve a decarbonized building stock by 2050.

57. A significant decrease in average unit consumption of total energy and space heating per m^2 has been achieved since 1990. However, owing to an increasing stock of electrical appliances, total electricity consumption per dwelling has increased by 3 per cent and electricity consumption for lighting and appliances has increased by 12 per cent, caused by an increasing stock of electrical appliances and larger homes.

However, the upward trend observed since 1990 has been reversed since 2010, with consumption falling due to the improved energy efficiency of lighting and appliances.

58. **Transport sector**. The transport sector accounted for 27.6 per cent of GHG emissions from the energy sector and 21.0 per cent of total GHG emissions excluding LULUCF in the EU in 2015. Between 1990 and 2015, emissions from the transport sector increased by 15.9 per cent (127,856.02 kt CO_2 eq).

59. In 2015, transport accounted for the largest share (33 per cent) of final energy consumption in the EU. The level of car ownership in the EU increased by 34 per cent between 1995 and 2015. Passenger transport increased by 23.8 per cent in the same period, with car transport increasing by 20.9 per cent. Of the total passenger kilometres, 71.5 per cent were travelled in passenger cars and 9.8 per cent were by air (domestic and intra-EU). Freight transport volume increased by 23.6 per cent between 1990 and 2015.

60. The choice of PaMs for the transport sector is driven by the need to address the notable increase in transport activities and related GHG emissions. The sectoral PaMs represent a mix between regulations and standards for efficiency improvement and emission reduction, as well as infrastructure improvement and incentives for modal shift.

61. The ESD is an overarching cross-sectoral policy that includes mitigation of emissions from transport (except aviation and international maritime transport). GHG emissions from domestic aviation are included under the EU ETS.

62. In addition to the ESD, binding targets have been set for emissions from new passenger cars: 130 g CO_2/km by 2015, reducing to 95 g CO_2/km by 2020. The average emission level of new cars sold in 2016 was 118.1 g CO_2/km. Similarly, the EU plans for CO_2 emissions from new vans to fall from 175 g CO_2/km in 2017 to 147 g CO_2/km in 2020.

63. Other PaMs include a 10 per cent target for renewable energy use in transport by 2020, applicable to EU member States, with contributions from biofuels (with a cap on food-based biofuels), renewable fuels of non-biological origin and electricity. In addition, the fuel quality directive introduced a binding target for fuel suppliers to reduce life-cycle GHG emissions per unit of energy by up to 6 per cent by 2020 compared with the 2010 level.

64. The EU's level of ambition for transport over the long term is that GHG emissions from the sector be reduced to meet the 2030 targets for the sectors covered by the effort-sharing regulation and then those emissions be reduced further to at least 60 per cent lower by 2050 compared with the 1990 level. This is included in the low-emission mobility strategy adopted by the European Commission in July 2016 that provides for an integrated and comprehensive approach in addressing mobility and emissions by increasing efficiency, promoting low-emission alternative energy for transport and zero-emission vehicles. Other objectives include a decrease in oil dependency and enhancing innovation and competitiveness in the transport industry.

65. Improving the efficiency of the transport system is geared towards digital mobility solutions, fair and efficient pricing to manage transport demand and promoting multimodality. Promoting low-emission alternative energy and decarbonizing transport fuels is to be achieved through an incentive framework to promote advanced biofuels, renewable electricity and synthetic fuels, relevant

infrastructure for alternative fuels and directives on fuel quality and renewable energy.

(c) Policies and measures in other sectors

66. **Industrial processes**. The IPPU sector is the third largest source of emissions in the EU. It contributed 8.7 per cent of total GHG emissions in 2015. Emissions from the sector decreased by 27.4 per cent, from 518 Mt CO_2 eq in 1990 to 376 Mt CO_2 eq in 2015, owing mainly to emission reduction measures taken in relation to the production of adipic acid, nitric acid and halocarbons.

67. The GHG mitigation policies in the industrial processes sector are underpinned by the cross-sectoral EU ETS and ESD, which cover all major installations. The sector-specific PaMs, such as the F-gas regulation, are aimed at reducing F-gas emissions. Additional efforts have been undertaken to reduce general air pollution with GHG mitigation as a co-benefit.

68. The F-gas regulation aims to reduce HFC sales by 79 per cent by 2030 through a quota system as well as to phase out F-gases with high GWP. Its effectiveness is demonstrated by an F-gas emission decline since 2015 and a strong price signal that further disincentivizes consumption. Also notable in this regard is the mobile air-conditioning systems directive, which imposes a ban on F-gases with high GWP for passenger cars and light-duty vehicles. The ERT notes that the EU is on track to meet the HFC limits set by the Kigali Amendment to the Montreal Protocol.

69. Additionally, the EU ETS directive covers a large part of industrial process emissions, specifically those from the mineral, chemical and metal industries, and the industrial emissions directive covers the remaining large industrial emissions sources outside the scope of the EU ETS; for example, direct and indirect GHG emissions are regulated through the implementation of best available techniques.

70. **Agriculture**. The agriculture sector is the second largest source of emissions in the EU. It contributed 10.1 per cent of total GHG emissions in 2015. Emissions from the sector decreased by 23.3 per cent, from 548.27 Mt CO_2 eq in 1990 to 436.75 Mt CO_2 eq in 2015, reflecting the decreasing cattle population as well as improvements in farm management practices (lower fertilizer and manure use on agricultural soils) and the implementation of agricultural and environmental policies.

71. The EU CAP, initiated in 1962, is one of the main policy drivers of EU agricultural development. The EU CAP is a multifaceted policy platform that provides for viable food production, sustainable natural resources management and climate action through a new greening architecture and balanced territorial development. As a result of the EU CAP reform in 2013, the EU CAP now includes GHG mitigation as a priority area and it is increasingly geared towards the sustainable management of natural resources and climate action through a new greening architecture. The EU relies on the combined effect of various EU CAP instruments, including cross-compliance standards, green direct payments and rural development funding.

72. In addition to the EU CAP, the EU implements a number of agricultural policies that promote sustainable land management, such as the EU timber regulation, the EU forest strategy, the EU biodiversity strategy to 2020, the NATURA 2000 directives, the waste framework directive, the soil thematic strategy and the nitrates directive. While the agricultural policies, except for the nitrates directive, are voluntary, they are supported by robust incentives. In particular, the EU CAP has a

pillar related to income support and financial incentives that encourage farmers to implement better land management activities.

73. There is a policy trend in the EU of increasingly moving towards more integrated approaches to climate action in the area of land use and agriculture that take into account both mitigation and adaptation and also links to other sustainable development and resource efficiency objectives, such as soil and water management, restoring and preserving biodiversity, supporting a climate-resilient economy, organic farming, and reduced pollution and pesticide use.

74. **LULUCF**. Net removals from LULUCF increased by 32.9 per cent in the EU over the period 1990–2015. In 2015, net removals from the LULUCF sector in the EU amounted to 295 Mt CO_2 eq. The key driver for the increase in net removals was a significant build-up of carbon stocks in forests. Overall, the total forested area across the EU increased by 5 per cent between 1990 and 2015. Moreover, environmental policies resulted in less-intensive agricultural practices and an increase in forest and woodland conservation areas for the purpose of preserving biodiversity and landscapes. In 2015, cropland and grassland were sources of emissions in the EU as a whole.

75. While afforestation and reforestation efforts in the EU are overseen by member States, a number of policies in place at the EU level enable mitigation in the LULUCF sector. For example, the EU forest strategy comprises eight linked priority areas, one of which concerns the relationship between climate and forests. The EU reported 679 PaMs mostly on forest management and other Kyoto Protocol activities, but also on protection against natural disturbances, carbon soil protection and biomass for energy use.

76. The 2013 LULUCF decision on accounting brought together different policy and accounting streams in the sector. The decision introduced mandatory requirements for reporting on national actions and their impacts. It also established accounting rules to incentivize actions that are consistent with the Convention and its Kyoto Protocol and to provide for fairness across EU member States.

77. There is an EU proposal from 2016 to integrate GHG emissions and removals from LULUCF into the 2030 climate and energy framework. The proposal reflects the prominence given to LULUCF in the post-2020 framework in helping the EU to reach its long-term mitigation objectives as well as the need to integrate it into various strategies (e.g. the Energy Union). The 2016 proposal strengthens reporting obligations through a stepwise approach and sets the "no-debit rule" as a binding commitment for EU member States to entirely compensate for any net emissions from LULUCF by means of an equivalent removal of CO_2 and ensures that only additional action provides credits to meet the emission reduction target for 2030.

78. An array of policies on biodiversity, soil, energy, agriculture, forestry and land management continue to be implemented in the EU. They influence emissions and removals from LULUCF that are subject to accounting under the LULUCF decision.

79. **Waste management**. GHG emissions from the waste sector contributed 3.2 per cent of total EU emissions in 2015. Emissions from the sector saw the most sizable decrease compared with other sectors, that is by 42.1 per cent, from 240.95 Mt CO_2 eq in 1990 to 139.31 Mt CO_2 eq in 2015.

80. GHG mitigation in this sector is mostly a co-benefit of the efficient waste management PaMs that aim to enhance solid waste treatment, minimization and

disposal methods. The waste management PaMs are described in the NC7 and additional information was provided to the ERT during the review.

81. The circular economy action package (2015) and the enhanced waste management hierarchy (prevention, reuse, recycling, recovery and disposal) are the key recent developments in the waste sector in the EU. PaMs are in place to target various waste streams such as plastic, electrical/electronic equipment, packaging, vehicles and batteries. There is also a regulation on waste treatment methods such as landfilling, incineration and management of biodegradable waste.

82. The EU is considering proposals for quantitative targets for 2030, including a common EU target for recycling 65 per cent of municipal waste, a common EU target for recycling 75 per cent of packaging waste and a binding landfill target to reduce landfill to a maximum of 10 per cent of municipal waste.

(d) Minimization of adverse impacts in accordance with Article 2 and Article 3, paragraph 14, of the Kyoto Protocol

83. In the NC7 the EU reported information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts on other Parties, especially developing country Parties.

84. Further information on how the EU strives to implement its commitments under Article 3, paragraph 14, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties was reported in its 2017 annual submission. The EU reported on the assessment of the economic and social consequences of its response measures, the adverse effects of climate change, the minimization of effects on international trade, and social, environmental and economic impacts on other Parties. The reporting included information on cooperating on the development of technologies, assisting developing country Parties that are highly dependent on the export of fossil fuels in diversifying their economies, and conducting relevant research.

(e) Assessment of adherence to the reporting guidelines

85. The ERT assessed the information reported in the NC7 of the EU and identified issues relating to completeness, transparency and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 8.

Table 8

Findings on policies and measures, including those in accordance with Article 2 of the Kyoto Protocol, from the review of the seventh national communication of the European Union

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement[a] specified in paragraph 25 Issue type: completeness Assessment: recommendation	The ERT noted that the EU provided a reference to its NC6, which contains information on how it believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals in accordance with the objective of the Convention, but that the NC7 did not contain such information. During the review, the Party referred the ERT to the statement in the NC7 that the European Commission routinely assesses and publishes analyses of the emission impacts of its policies. As an illustration, the Party referred the ERT to two recent reports, one by the European Commission in 2016 and the other by EEA in 2017, in which the impact of different EU policies on EU emissions was analysed.

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
		The ERT recommends that the EU provide, in its next NC, updated information on how it believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals consistent with the objective of the Convention.
2	Reporting requirement[a] specified in paragraph 16 Issue type: completeness Assessment: encouragement	In its NC7, the EU did not provide information on the identification and periodical updates of policies and practices that encourage activities that lead to greater levels of GHG emissions than would otherwise occur. During the review, the EU confirmed that such policies and practices were not identified during the preparation of the NC7. The ERT encourages the EU to include in its next NC information on whether the implementation of any EU policies may lead to greater levels of GHG emissions than would otherwise occur.
3	Reporting requirement[a] specified in paragraph 23 Issue type: transparency Assessment: encouragement	The EU did not report in its NC7 the estimated effects of most of its mitigation actions for 2020, including for some significant PaMs such as the EU ETS and the ESD. It provided a short explanation of the sources of information used for the PaMs for which effects were estimated. During the review, the EU provided additional information on the reasons why it did not report the estimated effects of all its mitigation actions. Owing to the complexity of the EU policymaking system and the particularities of each EU policy, aggregated data per EU policy implemented by member States cannot be compiled at the EU level. This is mainly because of the different ways policies are implemented by individual member States, and because of the way member States report on the impact of PaMs, which is not always consistent across member States. However, the estimated mitigation impacts of PaMs are, in many cases, reported in the BR of each member State. The ERT encourages the EU to improve the transparency of its reporting in its next NC by providing quantitative estimates of the impact of its PAMs or clearly explain why it may not be feasible to provide such information.
4	Reporting requirement[b] specified in paragraph 35 Issue type: completeness Assessment: recommendation	The ERT noted that NC7 did not include information on steps taken to promote and implement any decision of ICAO and IMO to limit GHG emissions from aviation and marine bunker fuels. The EU provided additional information during the review, including on its role in the development of the Carbon Offsetting and Reduction Scheme for International Aviation, in the global market-based measure of ICAO, and in the initial strategy of IMO for reducing GHG emissions from ships. The ERT recommends that the EU provide information on how it promotes and/or implements any decisions of ICAO and IMO to limit or reduce emissions of GHGs not controlled by the Montreal Protocol from aviation and marine bunker fuels.

Note: The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs.

[a] Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs.

[b] Paragraph number listed under reporting requirement refers to the relevant paragraph of the reporting guidelines for supplementary information.

C. Projections and the total effect of policies and measures, including information on supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

1. Projections overview, methodology and results

(a) Technical assessment of the reported information

86. The EU reported updated projections for 2020 and 2030 relative to actual inventory data for 2015 under the WEM scenario. The WEM scenario reported by the EU includes PaMs that had been implemented and adopted by May 2016, although this was not strictly enforced but rather recommended to member States as a guideline for preparing their individual projections.

87. In addition to the WEM scenario, the EU also reported the WAM scenario. The WAM scenario includes planned PaMs. The EU provided a definition of its scenarios, explaining that its WEM scenario is aggregated from 28 national WEM projections and based on a recommended list of adopted or implemented PaMs to be covered. Its WAM scenario includes all planned measures and is aggregated from available national WAM projections. During the review, the ERT was informed that 18 out of 28 member States reported a WAM scenario in 2017. For member States that did not provide a WAM scenario, it was assumed that their WAM projections were equal to those under their WEM scenario. The definitions indicate that the scenarios were prepared according to the UNFCCC reporting guidelines on NCs. The ERT was also informed that, because only five member States provided a 'without measures' scenario, it was not possible to construct such a scenario at the EU level.

88. The projections are presented on a sectoral basis, using the same sectoral categories as those used in the reporting on mitigation actions, and on a gas-by-gas basis for CO_2, CH_4, N_2O, HFCs, PFCs, SF_6 and NF_3 over the period 2020–2035. The projections are also provided in an aggregated format for each sector as well as for an EU total using GWP values from the IPCC Fourth Assessment Report.

89. The EU did not report emission projections for indirect GHGs such as carbon monoxide, nitrogen oxides, non-methane volatile organic compounds or sulfur oxides, as the MMR does not require the reporting of projections of indirect GHG emissions.

90. Emission projections related to fuel sold to ships and aircraft engaged in international transport were reported separately; emission projections for international aviation were included in the totals given that they fall within the scope of the Convention target for the EU. The EU qualitatively discussed factors and activities affecting emissions for each sector; however, no quantitative information was provided except for weighted-average assumptions on global parameters such as GDP and population growth or the evolution of fuel and carbon prices.

(b) Methodology, assumptions and changes since the previous submission

91. The methodology used for the preparation of the projections as well as the QA/QC procedures applied in the compilation of individual member States' projections are identical to those used for the preparation of the emission projections for the BR2. The EU provided further information, and references to publicly available reports, on its approach to compiling EU-level projections from individual member States' submissions under the MMR. The EU's GHG projections are

aggregated from national projections, and the individual member States are responsible for choosing the methods and models used for preparing their projections.

92. EEA and its ETC/ACM compile the national projections and apply QA/QC procedures to ensure that the projections data reported by member States are complete, transparent, consistent, accurate and comparable. If needed, additional data are requested from member States, or corrective actions such as data gap filling are performed to produce a final EU projections data set. The ERT commends the EU for the level of transparency and information available on the process of compiling GHG projections and applying QA/QC.

93. As the basis for its projections, the EU reported the following key underlying assumptions as weighted averages of the values used across the member States: population growth, international fuel prices (oil, gas and coal), EU ETS carbon price and GDP growth. These variables and assumptions were also reported in CTF table 5. The EU provided only recommendations on these assumptions to its member States; the final decision on the assumptions used for preparing GHG projections was made by each member State. According to the weighted-average assumptions for the period 2020–2030, the projections assumed an annual GDP growth rate of 1.9 per cent; annual fuel price growth rates of 3.3 per cent for oil, 2.4 per cent for gas and 3.8 per cent for coal; an EU ETS carbon price increase of 10.7 per cent annually; and an annual population growth rate of 0.14 per cent.

94. The EU did not provide any information in CTF table 5 on the changes since the submission of its NC6 and BR2 in the key variables and assumptions used in the preparation of the projection scenarios. The ERT encourages the EU to report changes in key assumptions, approach and results between current and previous NCs and BRs.

95. The EU provided information on the sensitivity analysis carried out when developing the GHG projections. Given the diversity of approaches and input assumptions used to prepare the 28 individual member States' projections, a standard sensitivity analysis where only one parameter is varied while others are kept fixed was not feasible. Therefore, the EU carried out a sensitivity analysis by benchmarking the aggregated GHG emissions against its 2016 reference scenario RS2016. RS2016 covers the EU energy system, transport and GHG emission developments across all sectors in all 28 EU member States individually and accounts for policy interactions. Its time-horizon is until 2050 with five-year steps. It assumes that the policies are adopted and implemented with December 2014 as the cut-off date. RS2016 is based on a suite of interlinked technical and economic models, at the centre of which is the PRIMES modelling suite. Models are calibrated against historical Eurostat data. The key parameters and assumptions used in the RS2016 were the same as those provided to the member States as recommended assumptions when developing their main projections. If member States used different assumptions, they were encouraged to use the recommended values for the sensitivity analysis of their national projections.

96. RS2016 starts from a 3 per cent higher GHG emission level than the reported WEM and WAM projections. Until 2020, emissions under RS2016 remain 1.5 per cent higher than under the WEM scenario. Beyond 2020, the RS2016 emissions drop at a faster rate than under the WEM scenario, so that from about 2023 the RS2016 emissions drop below the WEM projections. In 2030, the RS2016 emissions are projected to be 6.4 per cent lower than the WEM emissions. Differences between RS2016 and the WEM and WAM scenarios can be attributed

to several factors, such as differences in modelling approach, using different data for the starting year, different coverage of EU-wide measures, and different assumptions on GDP, population, and fuel and carbon prices.

(c) Results of projections

97. The projected emission levels under different scenarios and information on the Kyoto Protocol target and the quantified economy-wide emission reduction target under the Convention are presented in table 9 and the figure below.

Table 9
Summary of greenhouse gas emission projections for the European Union

	GHG emissions (kt CO_2 eq per year)	*Changes in relation to base-year[a] level (%)*	*Changes in relation to 1990 level (%)*
Kyoto Protocol base year[b]	5 875 693	NA	NA
Quantified emission limitation or reduction commitment under the Kyoto Protocol (2013–2020)[c]	15 813 089	NA	−20.0
Quantified economy-wide emission reduction target under the Convention[d]	Not available yet	NA	−20.0
Inventory data 1990[e]	5 711 969	NA	NA
Inventory data 2015[e]	4 450 150	−22.1	−22.1
WEM projections for 2020[f]	4 212 961	−26.2	−26.2
WAM projections for 2020[f]	4 179 457	−26.8	−26.8
WEM projections for 2030[f]	3 987 737	−30.2	−30.2
WAM projections for 2030[f]	3 871 984	−32.2	−32.2

Note: The projections are for GHG emissions without LULUCF.

[a] "Base year" in this column refers to the base year used for the target under the Kyoto Protocol, while for the target under the Convention it refers to the base year used for that target.

[b] The Kyoto Protocol base-year level of emissions is provided in the initial review report, contained in document FCCC/IRR/2016/EU.

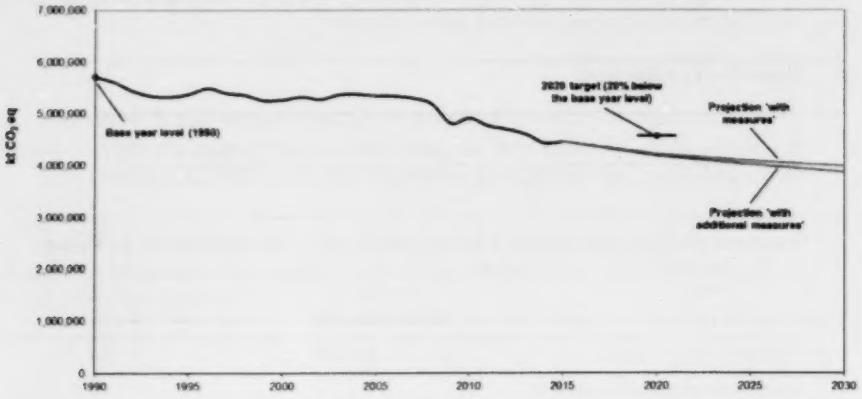
[c] The Kyoto Protocol target for the second commitment period (2013–2020) is a joint target of the EU and its 28 member States and Iceland. The target is to reduce emissions by 20 per cent compared with the base-year (1990) level by 2020. The target for non-ETS sectors is a 10 per cent reduction by 2020 below the 2005 level for the EU under the ESD. The value presented in table 9 corresponds to the assigned amount for the period 2013–2020, contained in document FCCC/IRR/2016/EU.

[d] The quantified economy-wide emission reduction target under the Convention is a joint target of the EU and its 28 member States. The target is to reduce emissions by 20 per cent compared with the base-year (1990) level by 2020.

[e] From the 2017 GHG inventory submission for the EU; the emissions are without LULUCF and indirect GHG emissions, but include international aviation.

[f] From the EU's NC7 and/or BR3.

Greenhouse gas emission projections reported by the European Union



Sources: (1) data for the years 1990–2015: the EU's 2017 annual inventory submission, version 2; total GHG emissions excluding LULUCF but including international aviation; (2) data for the years 2015–2030: the EU's NC7 and BR3; total GHG emissions excluding LULUCF but including international aviation.

98. The total EU GHG emissions excluding LULUCF but including international aviation in 2020 and 2030 are projected to be 4,212,961.07 and 3,987,736.85 kt CO_2 eq, respectively, under the WEM scenario, which represents a decrease of 26.2 and 30.2 per cent, respectively, below the 1990 level. Under the WAM scenario, emissions in 2020 and 2030 are projected to be lower than those in 1990 by 26.8 and 32.2 per cent and amount to 4,179,456.57 and 3,871,983.62 kt CO_2 eq, respectively. The reported 2020 projections suggest that the 28 EU member States are expecting to collectively achieve the 2020 EU target.

99. The EU presented the WEM and WAM scenarios by sector for 2020 and 2030, as summarized in table 10.

Table 10

Summary of greenhouse gas emission projections for the European Union presented by sector

	GHG emissions and removals (kt CO_2 eq)					*Change (%)*			
		2020		*2030*		*1990–2020*		*1990–2030*	
Sector	*1990*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*
Energy (not including transport)	3 554 774	2 255 541	2 235 680	2 069 293	1 990 351	-36.5	-37.1	-41.8	-44.0
Transport	781 808	889 971	881 280	886 373	859 180	13.8	12.7	13.4	9.9
Industry/industrial processes	516 886	373 009	372 052	339 655	337 448	-27.8	-28.0	-34.3	-34.7
Agriculture	548 270	431 482	427 764	430 503	425 290	-21.3	-22.0	-21.5	-22.4
LULUCF	0	0	0	0	0	-	-	-	-
Waste	240 948	117 675	117 024	99 034	96 463	-51.2	-51.4	-58.9	-60.0
International aviation	69 284	145 282	145 657	162 879	163 251	109.7	110.2	135.1	135.6

Sector	GHG emissions and removals (kt CO_2 eq)					Change (%)			
		2020		2030		1990–2020		1990–2030	
	1990	WEM	WAM	WEM	WAM	WEM	WAM	WEM	WAM
Total GHG emissions without LULUCF including aviation	5 711 969	4 212 961	4 179 457	3 987 737	3 871 984	-26.2	-26.8	-30.2	-32.2

Source: GHG emission data: the EU's 2017 annual inventory submission, version 2; projection data: BR CTF tables 6(a) and 6(c).

100. According to the projections reported for 2020 under the WEM scenario, the most significant emission reductions are expected to occur in the energy sector, amounting to projected reductions of 1,299,232.63 kt CO_2 eq (36.5 per cent) between 1990 and 2020. Significant GHG emission reductions are also projected for 2020 for the agriculture, industry and waste sectors at the levels of 21.3, 27.8 and 51.2 per cent, respectively, below the 1990 level. The absolute contributions of those sectors to the projected GHG emission reductions are 116,787.46, 143,877.29 and 123,272.46 kt CO_2 eq, respectively. The only sectors with projected emissions in 2020 still higher than in 1990 are the transport sector, where emissions are projected to be 108,163.32 kt CO_2 eq (or 13.8 per cent) higher relative to 1990, and international aviation, which is projected to increase its GHG emissions by 75,998.56 kt CO_2 eq (or 109.7 per cent) compared with the 1990 level. The pattern of projected emissions reported for 2030 under the same scenario remains similar, with the most significant declines in GHG emissions in the energy sector (41.8 per cent below the 1990 level), owing to the continued effects of existing PaMs, as well as in the agriculture, industry and waste sectors (decreasing by 21.5, 34.3 and 58.9 per cent, respectively). Transport emissions are projected to stabilize by 2030 at 13.4 per cent above the 1990 level, while emissions from international aviation are projected to continue growing by 2030 to 135.1 per cent above the 1990 level.

101. If additional measures are considered (i.e. under the WAM scenario), the patterns of emission reductions by 2020 presented by sector remain very similar to under the WEM scenario, with the emissions from the energy and agriculture sectors 0.9 per cent lower, industry 0.3 per cent lower, waste 0.6 per cent lower and transport 1.0 per cent lower than under the WEM scenario.

102. The EU presented the WEM and WAM scenarios by gas for 2020 and 2030, as summarized in table 11.

Table 11
Summary of greenhouse gas emission projections for the European Union presented by gas

Gas	GHG emissions and removals (kt CO_2 eq)					Change (%)			
		2020		2030		1990–2020		1990–2030	
	1990	WEM	WAM	WEM	WAM	WEM	WAM	WEM	WAM
CO_2	4 526 071	3 462 842	3 434 621	3 298 603	3 192 949	-23.5	-24.1	-27.1	-29.5
CH_4	728 435	417 522	415 431	394 804	390 177	-42.7	-43.0	-45.8	-46.4
N_2O	385 600	231 159	228 454	233 194	229 240	-40.1	-40.8	-39.5	-40.5
HFCs	34 966	90 915	90 427	54 038	52 524	160.0	158.6	54.5	50.2
PFCs	25 870	3 431	3 431	3 387	3 387	-86.7	-86.7	-86.9	-86.9

	GHG emissions and removals (kt CO_2 eq)					Change (%)			
		2020		2030		1990–2020		1990–2030	
Gas	1990	WEM	WAM	WEM	WAM	WEM	WAM	WEM	WAM
SF_6	11 003	7 006	7 006	3 605	3 600	-36.3	-36.3	-67.2	-67.3
NF_3	24	86	86	107	107	263.2	263.2	348.2	348.3
Total GHG emissions without LULUCF	5 711 969	4 212 961	4 179 457	3 987 737	3 871 984	-26.2	-26.8	-30.2	-32.2

Source: GHG emission data: the EU's 2017 annual inventory submission, version 2; projection data: BR CTF tables 6(a) and 6(c).

103. For 2020 the most significant absolute reductions are projected for CO_2, CH_4 and N_2O emissions: 1,063,228.95 kt CO_2 eq (23.5 per cent), 310,912.88 kt CO_2 eq (42.7 per cent) and 154,441.45 kt CO_2 eq (40.1 per cent) between 1990 and 2020, respectively. Collectively, emissions of F-gases are projected to increase by 29,575.34 kt CO_2 eq (41.2 per cent) by 2020 relative to 1990, mainly driven by higher HFC emissions.

104. The 2030 WEM scenario projections envisage similar trends continuing beyond 2020, with a continued decline in CO_2 and CH_4 emissions (to 27.1 and 45.8 per cent below the 1990 level, respectively), stagnation in N_2O emissions (at 39.5 per cent below the 1990 level) and a reversal of the emission trend for F-gases (to 14.9 per cent lower than in 1990) driven by the reduced HFC emissions due to the new F-gas regulation.

105. If additional measures are considered (i.e. in the WAM scenario), the patterns of emission reductions by 2020 presented by gas remain very similar to under the WEM scenario, with CO_2, CH_4 and N_2O emissions 24.1, 43.0 and 40.8 per cent, respectively, below the 1990 level and F-gas emissions 40.5 per cent above the 1990 level. Similar trends also continue towards 2030, when emissions of CO_2, CH_4 and N_2O are projected to be 29.5, 46.4 and 40.5 per cent, respectively, below the 1990 level, while, similar to under the WEM scenario, F-gas emissions are projected to reverse their growth and drop to 17.0 per cent below the 1990 level.

(d) Assessment of adherence to the reporting guidelines

106. The ERT assessed the information reported in the NC7 of the EU and identified issues relating to completeness, transparency and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 12.

Table 12

Findings on greenhouse gas emission projections reported in the seventh national communication of the European Union

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
1	Reporting requirement specified in paragraph 48 Issue type: completeness	The NC7 does not include the relevant information on factors and activities for each sector to provide the reader with an understanding of past and future emission trends. During the review, the EU explained the difficulties associated with compiling such data from the individual member States' reports.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
	Assessment: recommendation	The ERT recommends that an overview of key sector-specific information, such as primary energy consumption, electricity generation and transport volume, be included in the GHG projections in future NCs to the extent possible, or alternatively that an explanation be provided as to why such information is difficult to compile.
2	Reporting requirement specified in paragraph 31 Issue type: transparency Assessment: encouragement	The ERT noted that projections are presented relative to actual inventory data for the preceding years but with a different scope than in the GHG inventory chapter, thus decreasing transparency. During the review, the EU clarified that the inventory data in the projections chapter did not include indirect CO_2 emissions, whereas the inventory information reported in the GHG inventory chapter did include indirect CO_2 emissions. The ERT encourages the EU to present GHG projections in future NCs using the same scope as when presenting inventory and quantified progress data.
3	Reporting requirement specified in paragraph 43 Issue: transparency Assessment: encouragement	The information reported in the NC is not transparent on the following elements: the strengths and weaknesses of modelling approaches and how the approaches used account for any overlap or synergies that may exist between different PaMs. During the review, the ERT was presented with details on the approach used to compile member States' projections into an aggregated EU submission, along with the challenges due to inevitable variations in approaches between countries. The ERT encourages the EU to include more information about the modelling approaches used, their strengths and weaknesses, and the treatment of synergies and overlaps between PaMs, including the explanations provided during the review, in future NCs.
4	Reporting requirement specified in paragraph 45 Issue type: completeness Assessment: encouragement	There was no information reported on the main differences in the assumptions, methods and results between the projections in the NC7 and those in earlier NCs (there was only a statement that no change in methodology had occurred since the previous report). The ERT encourages the EU to report changes in assumptions, approaches and results between current and previous NCs in its future submissions, noting any changes that may make comparison difficult or not entirely consistent.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs and on BRs.

2. Assessment of the total effect of policies and measures

(a) Technical assessment of the reported information

107. In the NC7 the EU presented the estimated total effect of implemented and adopted PaMs. The information is presented in terms of GHG emissions avoided or sequestered, by gas (on a CO_2 eq basis) and by sector, in 2020 and 2025. As with the GHG projections, the assessment of the total effect of PaMs did not include the relevant information on factors and activities for each sector.

108. The total aggregate effect of implemented and adopted PaMs was estimated using a bottom-up approach, by adding up the effects of individual PaMs listed in the EEA PaMs database. The total effect of planned measures on the other hand was estimated using a top-down approach, by calculating the difference between the GHG emissions under the WEM and WAM scenarios. As the sectoral breakdown of the PaMs database does not correspond fully with the *2006 IPCC Guidelines for*

National Greenhouse Gas Inventories, on which the WEM and WAM projections are based, the sectoral breakdown of the total effect of implemented and adopted PaMs is slightly different from that of the total effect of planned measures, which follows the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. The ERT noted that the approach used to evaluate the aggregate effect of implemented and adopted PaMs did not include consideration of synergies or overlaps between individual PaMs.

109. The EU reported that the total estimated effect of its adopted and implemented PaMs in 2020 is 562,240 kt CO_2 eq. According to the information reported in the NC7, PaMs implemented in the energy sector will deliver the largest emission reductions (392,161 kt CO_2 eq), followed by PaMs implemented in transport (75,321 kt CO_2 eq) and industry (39,566 kt CO_2 eq). The total effect of implemented and adopted PaMs in 2025 is estimated at 575,892 kt CO_2 eq, or 2.4 per cent above the 2020 level. The total effect of planned measures was estimated at 33,879 and 69,276 kt CO_2 eq in 2020 and 2025, respectively. Table 13 provides an overview of the total effect of PaMs as reported by the EU.

Table 13
Projected effects of the European Union's planned, implemented and adopted policies and measures by 2020 and 2025

	2020		*2025*	
Sector	*Effect of implemented and adopted measures (kt CO_2 eq)*	*Effect of planned measures (kt CO_2 eq)*	*Effect of implemented and adopted measures (kt CO_2 eq)*	*Effect of planned measures (kt CO_2 eq)*
Energy (without transport)	392 161	19 861	432 573	44 219
Transport	75 321	8 691	66 134	15 533
Industrial processes	39 566	957	47 567	3 518
Agriculture	8 607	3 718	7 780	4 292
Land-use change and forestry[a]	-	-	-	-
Waste management	15 360	652	8 866	1 713
Cross-cutting[b]	31 225	-	12 971	-
Total	**562 240**	**33 879**	**575 892**	**69 276**

Source: The EU's NC7.

Note: The total effect of implemented and adopted PaMs is defined as the sum of the effects of individual PaMs from EEA's PaMs database; the total effect of planned PaMs is defined as the difference between the WEM and the WAM scenario.

[a] Not reported.

[b] Only reported for implemented and adopted PaMs.

(b) Assessment of adherence to the reporting guidelines

110. The ERT assessed the information reported in the NC7 of the EU and recognized that the reporting on the assessment of the total effect of PaMs is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

3. Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

(a) Technical assessment of the reported information

111. In the NC7 the EU provided information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. The EU reported that there is no clear picture on the likely use of flexible mechanisms for the second commitment period of the Kyoto Protocol. During the review, the EU provided additional information referring to a report on progress towards meeting the EU's climate commitments (European Commission, 2017). According to the report, member States' latest projections based on existing measures indicate that emissions are expected to be 26 per cent lower in 2020 than in 1990; therefore, the EU remains on track to meet its emission reduction target of 20 per cent by 2020 with such measures and consequently its obligations under the second commitment period of the Kyoto Protocol.

112. The ERT noted that the EU reported in BR3 CTF table 4 on the use of units from market-based mechanisms under the Convention. It is unclear how many units will be used to meet the 2020 targets.

(b) Assessment of adherence to the reporting guidelines

113. The ERT assessed the information reported in the NC7 of the EU and recognized that the reporting on supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol is complete and transparent. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

D. Provision of financial and technological support to developing country Parties, including information under Articles 10 and 11 of the Kyoto Protocol

1. Financial resources, including under Article 11 of the Kyoto Protocol

(a) Technical assessment of the reported information

114. The EU reported information on the provision of financial support required under the Convention and its Kyoto Protocol, including on financial support provided, committed and pledged, allocation channels and annual contributions.

115. The EU indicated what "new and additional" financial resources it has provided and clarified how it has determined such resources as being "new and additional". The definition provided by the EU is that the resources reported in the NC7 are "new and additional" because they were committed in 2015 and 2016 and as such they were not included in the previous BR.

116. The EU described how its resources address the adaptation and mitigation needs of non-Annex I Parties. It also described how those resources assist non-Annex I Parties to mitigate and adapt to the adverse effects of climate change, facilitate economic and social response measures, and contribute to technology development and transfer and capacity-building related to mitigation and adaptation. The EU reported information on the assistance that it has provided to developing country Parties that are particularly vulnerable to the adverse effects of climate change to help them to meet the costs of adaptation to those adverse effects. Of the total climate finance provided by the EU in 2015 and 2016, at least EUR 1.4 billion (33 per cent)

was provided to the least developed countries. The provided information shows that support provided is tailored to their needs, as 60 per cent of the climate finance provided to the least developed countries went to adaptation activities, while mitigation and cross-cutting activities received 30 per cent and 10 per cent, respectively.

117. With regard to the most recent financial contributions aimed at enhancing the implementation of the Convention by developing countries, the EU reported that its climate finance has been allocated on the basis of programmes such as the Pan-African Programme. The Development Cooperation Instrument covers the majority of developing countries and its thematic programme on the global public good and challenges has a focus on climate change. No less than 25 per cent of the programme's budget will be spent on achieving climate change and environment objectives. The Development Cooperation Instrument budget for 2014–2020 is EUR 19.6 billion, including EUR 7 billion for the thematic programmes. Table 14 includes some of the information reported by the EU on its provision of financial support.

Table 14
Summary of information on provision of financial support by the European Union in 2015–2016
(Millions of United States dollars)

	Year of disbursement	
Allocation channel of public financial support	*2015*	*2016*
Official development assistance[a]	20 206.4	23 282.7
Climate-specific contributions through multilateral channels	0.436	0.448
Climate-specific contributions through bilateral, regional and other channels	4 204.68	5 174.65

[a] *Sources*: (1) Query Wizard for International Development Statistics, available at http://stats.oecd.org/qwids/ for EU institutions; (2) the EU's BR3 CTF tables.

118. The EU is developing public initiatives to mobilize private climate finance directly and to support the creation of appropriate enabling environments. The EU supports middle-range electrification projects through ElectriFI, whose first call for applications generated 290 proposals requesting EUR 800 million to leverage a total investment amount of EUR 8.5 billion for 3.7 GW renewable energy capacity in 55 countries. However, the EU mentioned that there are barriers to private sector low-carbon investments in developing and recipient countries.

(b) Assessment of adherence to the reporting guidelines

119. The ERT assessed the information reported in the NC7 of the EU and recognized that the reporting on financial resources, including under Article 11 of the Kyoto Protocol, is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

2. Technology development and transfer, including information under Article 10 of the Kyoto Protocol

(a) Technical assessment of the reported information

120. The EU provided information on steps, measures and activities related to technology transfer, access and deployment benefiting developing countries,

including information on activities undertaken by the public and private sectors. The EU presented examples of support provided for the deployment and enhancement of the endogenous capacities and technologies of non-Annex I Parties.

121. The ERT noted that the EU reported on its PaMs as well as success and failure stories in relation to technology transfer, and in particular on measures taken to promote, facilitate and finance the transfer and deployment of climate-friendly technologies. The EU has mainstreamed technology transfer activities into all development support. The NC7 included the following examples of programmes to promote technology development and transfer: the Horizon 2020 research framework programme, which promotes research collaboration and the mobility of researchers between the EU and third countries, including developing countries, in areas of common interest; and the Technical Centre for Agricultural and Rural Cooperation, which supports the development and enhancement of the endogenous capacities and technologies of developing country Parties, combined with facilitating innovation in the private sector.

122. The EU provided information on selected projects or programmes that promote practicable steps to facilitate and/or finance the transfer of, or access to, environmentally sound technologies as per the UNFCCC reporting guidelines on NCs. Both selected projects were success stories, and information on factors that led to the project's success was provided for one project. Information on the impact on GHG emissions or sinks was not provided as it was unavailable.

123. The EU provided information on steps taken to promote, facilitate and finance the transfer of technology to developing countries and to build their capacity in order to facilitate the implementation of Article 10 of the Kyoto Protocol.

124. The EU recognizes that the private sector is critical to the successful transfer of technologies to developing countries. The private sector is able to mobilize larger amounts of capital and is a key driver of technological innovation. However, public funds are needed to leverage private finance. The EU has devised innovative ways of engaging the private sector and raising the needed climate finance. It designed the Global Energy Efficiency and Renewable Energy Fund to catalyse private sector capital for clean energy projects in developing countries.

(b) Assessment of adherence to the reporting guidelines

125. The ERT assessed the information reported in the NC7 of the EU and recognized that the reporting on technology development and transfer is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

E. Vulnerability assessment, climate change impacts and adaptation measures

1. Technical assessment of the reported information

126. In the NC7 the EU provided the required information on the expected impacts of climate change in Europe; the adaptation policies covering regional, sectoral and cross-sectoral vulnerabilities and considerations; and an outline of the action taken to implement Article 4, paragraph 1(b) and (e), of the Convention with regard to adaptation at the EU level. The EU provided the results of climate change vulnerability and impact analyses on food production and supply, forestry, marine resources and fisheries, energy, infrastructure and urban settlements, biodiversity,

ecosystems, health, economic activity and employment, and social issues. Table 15 summarizes the information on vulnerability and adaptation to climate change presented in the NC7 of the EU and additional information on the implementation of adaptation measures by sector provided during the review and in the NC7s of member States. The ERT noted that it would be useful to enhance the transparency of the reporting further by providing summary information and prominent examples of the promotion of adaptation measures carried out, ongoing or planned by sector in the next NC.

127. The NC7 highlighted the climate change adaptation actions taken and planned at the EU level. The ERT noted that climate change adaptation strategies, policies and actions, including mainstreaming adaptation in policies, are progressing at all governance levels. Impetus has been given by the EU to promoting actions by member States, given the site-specific nature of adaptation responses. Also, stimulated by the EU Adaptation Strategy adopted in 2013, 25 member States have approved national adaptation strategies (compared with 15 in 2003) and 15 member States have developed national and/or sectoral action plans aimed at implementing adaptation measures in vulnerable areas and relevant funding. Attention to adaptation is also increasing at the municipality level, as manifested by the increased participation in the former Mayors Adapt initiative and the Covenant of Mayors for Climate and Energy of 1,078 signatories from 33 countries (March 2018) that are committed to vulnerability and risk assessments, to develop, implement and report on adaptation plans.

128. The ERT noted that progress has been made in continuously strengthening the evidence-based knowledge on climate vulnerability and impacts, as manifested in the 7th Framework Programme and Horizon 2020, in order to support the use of decision-making to enhance efforts to increase climate resilience and to enhance preparedness for climate change adaptation. This is also reflected in the ClimateADAPT platform, which provides sound information on vulnerability and adaptation. Impetus has also been given to promoting adaptation in key vulnerable sectors, and more than EUR 114 billion of the European Structural and Investment Funds contribute to EU climate mitigation and adaptation policy, namely the EU Regional and Cohesion Policy, the EU Common Agricultural Policy, the EU Integrated Maritime Policy, the EU Common Fisheries Policy, and the EU Social and Employment Policy.

129. In 2014 the European Commission developed an adaptation preparedness scoreboard to identify key indicators for measuring member States' level of readiness. The analysis performed as part of the scoreboard activities indicates that, although the member States have adopted strategies, implementation requires continuous support (sustenance). An evaluation of the adaptation strategy aimed at assessing the degree of its implementation and the achievement of its objectives is under way.

Table 15

Summary of information on vulnerability and adaptation to climate change reported by the European Union

Vulnerable area	*Examples comments adaptation measures reported*
Agriculture and food security	*Vulnerability*: Decrease in agricultural productivity across many European regions, increase in crop yields in boreal region, advancement of flowering and harvest dates in cereals, increase in crop water demand, increased irrigation needs mostly in southern and central Europe, shift in food production from southern to

Vulnerable area	*Examples comments adaptation measures reported*
	northern Europe, increased impact on agricultural commodities owing to climate change impacts outside European territory. *Adaptation*: Promoting crop diversification, improving cultivar tolerance to high temperatures, increasing organic farming, maintaining permanent pasture, improving irrigation technologies, more effective water harvesting, promoting agricultural practices that increase soil water retention.
Biodiversity, ecosystems and ecosystem services	*Vulnerability*: Habitat fragmentation and loss, especially in the Mediterranean; spread of invasive species; impacts on ecosystems' resilience and their capacity to provide services. *Adaptation*: Promoting ecosystem-based adaptation measures and improving knowledge on the combined effects of climate change and other pressures on ecosystems and their capacity to provide services.
Coastal zones	*Vulnerability*: Coastal erosion, sea level rise, increased storms, higher waves, saltwater intrusion. *Adaptation*: Measures such as dike building or renovation, beach nourishment, rehabilitation of coastal ecosystems, terrestrial spatial planning, integrated coastal zone management, flood hazard and flood risk maps according to the EU floods directive.
Marine resources and fisheries	*Vulnerability*: Increase in sea surface temperature; increase in ocean acidity; northward migration of marine species; changes in species composition, nutritional value and size; negative impacts on the resilience of marine ecosystems; retreat northward of colder water plankton in the North-East Atlantic; impact on the livelihoods of fishing communities. *Adaptation*: Maritime spatial planning, restructuring/promotion of dense fish and shellfish cultivation in both fresh and salt water.
Forests	*Vulnerability*: Shifts of tree species towards higher altitudes and latitudes, increased risk of forest fires particularly in southern Europe, increased incidence of forest pests/insects, impact on the goods and services provided by forests. *Adaptation*: Enhancing forests' adaptive capacities and resilience to climate change; reducing the risks and effects of forest fires, pests, diseases and invasive alien species; increasing the climate change adaptation potential of forests without compromising other forest benefits.
Human health	*Vulnerability*: Greater mortality due to heatwaves and other extreme weather events, impacts on the transmission cycles of vector-borne diseases, possible effects on incidence of water- and food-borne diseases, increased levels of some airborne allergens and associated increases in allergic illnesses. *Adaptation*: Improving and maintaining the early warning and monitoring systems for vector-borne diseases, rapid response to climate change related disease outbreaks, climate-resilient health care, other public service infrastructure; developing extreme weather event action plans, disaster preparedness and response.
Infrastructure and urban settlements	*Vulnerability*: Flood damage to buildings and infrastructure in coastal areas within river catchments and with poor urban drainage due to increased incidence of heavy rainfall; risk of inundation due to higher sea levels and extreme weather events. *Adaptation*: Integration of adaptation into infrastructure standards, efficient cooling and heating of buildings, promotion of ecosystem-based adaptation measures, update of risk maps.
Freshwater resources	*Vulnerability*: Reduction of water availability due to extreme high temperatures and droughts in the Mediterranean region; high-cost

Vulnerable area	*Examples comments adaptation measures reported*
	damage due to increased frequency and intensity of floods from rivers and storm surges. *Adaptation*: Update of river basin management plans to consider the reorganization of water extraction, taking into account future groundwater resources and water flow/quality of watercourses and wetlands.
Energy	*Vulnerability*: Change in demand patterns (decrease in energy demand for heating and increase in demand for cooling), increasing stress due to extreme weather events on hydroenergy production. *Adaptation*: Promoting energy efficiency, particularly in the buildings, transportation and production sectors; promoting greater production of renewable energy and altered consumption patterns, with less heating in winter and more cooling in summer.
Economic activity and employment	*Vulnerability*: Increasing risk for physical capital assets due to extreme weather events and sea level rise, high economic costs to cope with climate change, winter tourism under pressure in mountainous areas. *Adaptation*: Development of guidelines for project developers on climate proofing vulnerable investments; promoting creation of new business opportunities (new products and services to help people to adapt).

130. With regard to cooperation with non-Annex I Parties in preparing for adaptation, the NC7 provides a detailed description of international contributions, including access to open data products and climate change information provided through Copernicus, the European Earth Observation Programme. The ERT notes that it is important to support developing countries in their endeavour to develop research-based adaptation policies. The EU also provided information on bilateral cooperation with developing countries on adaptation, such as support for developing regional and sectoral plans, namely national adaptation programmes of action and national adaptation plans. The EU also participates in regional processes (e.g. with African environment ministries) and supports relevant regional institutions (e.g. the Caribbean Community Climate Change Centre) on climate change issues. Among others, the EU has funded the Covenant of Mayors in Sub-Saharan Africa to share knowledge and best practices and increase planning capacities to address the challenges of energy access, climate change mitigation and adaptation in more than 20 African cities. The EU also establishes and maintains strategic partnerships such as the Africa–EU Strategic Partnership and the Joint Declaration on Sustainable Energy (between the EU, the European Investment Bank and the Caribbean Forum).

2. Assessment of adherence to the reporting guidelines

131. The ERT assessed the information reported in the NC7 of the EU and recognized that the reporting on vulnerability assessment, climate change impacts and adaptation measures is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

F. Research and systematic observation

1. Technical assessment of the reported information

132. The EU provided information on its general policy and funding relating to research and systematic observation that covers both domestic and international activities, including contributions to the World Climate Programme, the

International Geosphere–Biosphere Programme, the Global Climate Observing System and the IPCC. The EU also provided information on the identification of opportunities for and barriers to free and open international exchange of data and information and on action taken to overcome such barriers.

133. The EU attaches high priority to climate change research, systematic observation and climate modelling that aim to advance capabilities to predict and observe the physical, chemical, biological and human components of the Earth's system over space and time, and has implemented and planned a number of relevant international and domestic policies and programmes. The NC7 provides a comprehensive list of ongoing or planned projects financed by Horizon 2020, the Connecting Europe Facility, the Financial Instrument for the Environment, Copernicus, and Europe's programme for small and medium-sized enterprises (COSME). These projects break new ground and support innovation in the following areas: climate system studies (2 projects), climate modelling and prediction (10 projects), climate change impacts (6 projects), socioeconomic analyses (14 projects), development of adaptation and mitigation technologies (33 projects), and research and demonstration of climate services. A high priority is also given to fostering international cooperation on research and innovation. Overall climate-related expenditure should exceed EUR 16.6 billion or 35 per cent of the total budget of Horizon 2020.

134. In terms of activities related to systematic observation, the EU reported on national plans, programmes and support for ground- and space-based climate observing systems, including satellite and non-satellite climate observation. The EU contributes to systematic observation through various programmes (research and innovation programmes, Horizon 2020, Copernicus, JRC activities). The role of Copernicus in providing services related to the Earth and satellite data and to the European Earth observation system has been crucial in providing climate information to decision makers in Europe and worldwide. The EU also reported on challenges related to the maintenance of a consistent and comprehensive observation system. In addition to the numerous existing actors in the research and systematic observation field, three new actors have been established since the NC6: the European Research Council, which pursues advanced research by new talented researchers; the Research Executive Agency; and the Executive Agency for Small and Medium-sized Enterprises. The ERT commends the EU for the prominence given to research and systematic observation activities and relevant deliveries.

135. The NC7 reflects actions taken to support capacity-building and the establishment and maintenance of observation systems and related data and monitoring systems in developing countries. Examples of projects to support the establishment and maintenance of observing systems include Agricab, EO2 Heaven, Geo-Cradle and Ground Truth 2.0. One of the main EU institutions that works closely with developing countries is the JRC, which supports the establishment and prototyping of regional forest observatories in East Africa and South-East Asia. The JRC also supports partner institutions in tropical countries (i.e. forestry departments, government institutions) having access to Copernicus data and developing monitoring approaches to assess forest degradation. The EU provided funding for scientists from developing countries to conduct such research as part of the EU research programmes. The ERT commends the EU for its contribution to research and systematic observation.

2. Assessment of adherence to the reporting guidelines

136. The ERT assessed the information reported in the NC7 of the EU and recognized that the reporting on research and systematic observation is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

G. Education, training and public awareness

1. Technical assessment of the reported information

137. In the NC7 the EU provided extensive information on its actions relating to education, training and public awareness at the EU level, considering that the responsibility for education and training policies lies with its member States and the EU has mainly a supporting role. Since the NC6, progress has been made in supporting member States' activities related to primary, secondary and higher education comprising the education aspects of the Erasmus+, Horizon 2020, Climate-KIC and InnoEnergy programmes. More specifically, within Erasmus+, opportunities are created for student exchanges in different study cycles (bachelor, master and doctoral or equivalent) within programme and partner countries. About 800,000 lecturers, teachers, trainers, education staff and youth workers and about 650,000 vocational education and training students are envisaged to profit from the Erasmus+ programme between 2014 and 2020. Also, Horizon 2020 has launched a call to direct young talented people towards research, technology engineering and innovation.

138. Public awareness on climate change issues is very high, which is essential to support ambitious climate policies. The EU provided information on wider public information campaigns since the NC6 and results of studies of public opinion. Eurobarometer 2017 indicated that 92 per cent of EU citizens see climate change as a serious problem and 79 per cent believe that fighting climate change can boost the economy and create jobs. Some major activities include the EU Climate Diplomacy Day, EU Open Doors Day, Covenant of Mayors for Climate and Energy, EU Sustainable Energy Week, Resource Efficiency Campaign, EU Green Week and European Mobility Week. The NC7 provides a long list of climate change related websites and social media, video productions, education materials and resource or information centres.

139. The EU is also supporting a number of activities to implement Article 6 of the Convention in developing countries and other third countries through the Global Climate Change Alliance flagship initiative, in line with the European Commission's new Multiannual Financial Framework (2014–2020), through contributions to the World Bank Partnership for Market Readiness, through the International Carbon Action Partnership and through capacity-building by the Group on Earth Observations. The European Commission has a leading role in the Converting Sunlight Innovation Challenge to create storable solar fuels and the Affordable Heating and Cooling of Buildings Innovation Challenge within the framework of the global Mission Innovation initiative.

2. Assessment of adherence to the reporting guidelines

140. The ERT assessed the information reported in the NC7 of the EU and identified an issue relating to transparency and adherence to the UNFCCC reporting guidelines on NCs. The finding is described in table 16.

Table 16
Findings on education, training and public awareness from the review of the seventh national communication of the European Union

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 65 Issue type: transparency Assessment: encouragement	The ERT noted that the NC7 of the EU was drafted and created in consultation with relevant stakeholders in the member States and an interservice consultation was conducted within the European Commission. However, no specific information was reported on the extent of public participation in the preparation or domestic review of the NC7. The ERT encourages the EU to report on public participation in the preparation and/or review of its NC in its next NC.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs.

III. Conclusions and recommendations

141. The ERT conducted a technical review of the information reported in the NC7 of the EU in accordance with the UNFCCC reporting guidelines on NCs. The ERT concludes that the reported information mostly adheres to the UNFCCC reporting guidelines on NCs and that the NC7 provides an overview of the climate policy of the EU.

142. The information provided in the NC7 includes most of the elements of the supplementary information under Article 7 of the Kyoto Protocol, with the exception of information on the functioning of the national registry, on institutional arrangements and decision-making procedures that the EU has in place to coordinate activities relating to participation in the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol, on its national legislative arrangements and administrative procedures that also contribute to the conservation of biodiversity and the sustainable use of natural resources, and on steps taken to promote and/or implement any decision of ICAO and IMO. The EU provided the missing information to the ERT during the review. Supplementary information under Article 7, paragraph 1, of the Kyoto Protocol on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol was provided by the EU in its 2017 annual submission.

143. The total GHG emissions of the EU excluding LULUCF covered by its quantified economy-wide emission reduction target were estimated to be 23.7 per cent below its 1990 level, whereas total GHG emissions including LULUCF were 26.0 per cent below its 1990 level, in 2015. The decrease in the total emissions was driven by a combination of economy-wide, sector-specific and climate-related drivers, including (1) structural changes in the economy, with an increased share of services on account of the reduced share of energy-intensive industrial activities, and the effects of the economic recession in the first decade of the 2000s; (2) the increased decarbonization of the fuel supply mix resulting from the shift from coal to gas for electricity and heat production, the increased use of renewable energy sources for power generation and energy efficiency improvements, which altogether have been influenced by a number of climate and energy policies at both the EU and member State level; and (3) variation in climatic conditions in Europe and related

changes in the demand for heating. These drivers also led to the decoupling of the GDP and GHG emission trends in the EU. The only major sector with increased emissions between 1990 and 2015 was the transport sector.

144. The key overarching cross-sectoral policy in the EU is the 2020 climate and energy package, adopted in 2009, which includes the revised EU ETS and the ESD, which are critical for attaining the EU-wide emission reduction target by 2020 and the Kyoto Protocol target in the second commitment period. The package is supplemented and reinforced by a number of cross-cutting and sectoral PaMs covering renewable energy, energy efficiency, heating and cooling, energy taxation, eco-design requirements for products, energy labelling, low-emission mobility, CO_2 emission standards for cars and vans, F-gases, carbon capture and storage, LULUCF accounting, the circular economy, and the general programmes for environmental conservation, namely the 7th Environment Action Programme and the clean air policy package. The new EU 2030 climate and energy framework builds upon the EU 2020 climate and energy package and is in line with the EU's road map for moving to a competitive low-carbon economy by 2050. Another important aspect is the EU's commitment to spending at least 20 per cent of its budget for the period 2014–2020 on climate-related actions.

145. The GHG emission projections provided by the EU include those under the WEM and WAM scenarios for 2020 and 2030. The EU's total GHG emissions excluding LULUCF but including international aviation in 2020 and 2030 under the WEM scenario are projected to be 26.2 and 30.2 per cent below the 1990 level, respectively. Under the WAM scenario emissions in 2020 and 2030 are projected to be lower than those in 1990 by 26.8 and 32.2 per cent, respectively. On the basis of the reported information, the ERT concludes that the EU expects to meet its 2020 target under the WEM and WAM scenarios.

146. The projections also indicate that the EU can meet its Kyoto Protocol target for the second commitment period (20 per cent emission reduction in the period 2013–2020 compared with the 1990 level), even under the WEM scenario, and that GHG emissions are not expected to exceed the Kyoto Protocol target even by 2020.

147. The NC7 contains information on how the Party's use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic mitigation actions, although it did not elaborate on supplementarity as such. The EU stated that, currently, there is no clear picture on the likely use of flexible mechanisms for the second commitment period of the Kyoto Protocol, although units from flexible mechanisms could be used by EU member States as well as by EU ETS operators in achieving their targets.

148. The EU has continued to provide climate financing to developing countries in line with its climate finance instruments such as the Development Cooperation Instrument, the European Neighbourhood and Partnership Instrument and the European Development Fund. It has increased its contributions by 22.1 per cent since its BR2 and its public financial support in 2015 and 2016 totalled USD 4.205 and 5.175 billion, respectively. In those years the EU provided more support for mitigation than for adaptation. The biggest share of financial support went to projects in the agriculture, energy and transportation sectors, followed by the water and sanitation and forestry sectors. The EU provided information on steps, measures and activities related to research and deployment of climate-friendly technologies to developing countries through different programmes (for instance, Horizon 2020). It recognizes the important role of the private sector in mobilizing financial resources

to leverage public funds for the successful transfer of technologies to developing countries.

149. The EU provided the results of climate change vulnerability and impact analyses on food production and supply, forestry, marine resources and fisheries, energy, infrastructure and urban settlements, biodiversity, ecosystems, health, economic activity and employment, and social issues. Climate change adaptation strategies, policies and actions, including mainstreaming adaptation into policies, are progressing at all governance levels. As a follow-up to the EU Adaptation Strategy, adopted in 2013, 25 member States have approved their national adaptation strategies (compared with 15 in 2003) and 15 member States are developing national and/or sectoral action plans aimed at implementing adaptation measures in vulnerable areas and relevant funding. The EU has given impetus to promoting actions by member States given the site-specific nature of adaptation responses, particularly at the municipality level, which is manifested in the increased participation of municipalities in the integrated Covenant of Mayors initiative that are committed to vulnerability and risk assessments, to develop, implement and report on adaptation plans. Progress is also being made in continuously strengthening the evidence-based knowledge on climate vulnerability and impacts, as manifested in the 7th Framework Programme and Horizon 2020, in order to support decision-making to enhance efforts to increase climate resilience and to enhance preparedness for climate change adaptation. With regard to cooperation with developing countries, the EU provides regional and bilateral support in developing national adaptation programmes and plans and has established strategic partnerships on adaptation and sustainable energy, particularly focused on Africa.

150. The EU gives high priority to climate change research, systematic observation and climate modelling that aim to advance capabilities to predict and observe the physical, chemical, biological and human components of the Earth's system over space and time, and has implemented and planned a number of relevant international and domestic policies and programmes. High priority is also given to fostering international cooperation on research and innovation. Overall climate-related expenditure should exceed EUR 16.6 billion or 35 per cent of the total budget of Horizon 2020. In terms of activities related to systematic observation, the EU reported on national plans, programmes and support for ground- and space-based climate observing systems, including satellite and non-satellite climate observation.

151. The EU provided extensive information on its actions relating to education, training and public awareness at the EU level, considering that the responsibility for education and training policy lies with its member States and the EU has mainly a supporting role. Since the NC6, progress has been made in supporting member States' activities related to primary, secondary and higher education that comprise the education aspects of the Erasmus+, Horizon 2020, Climate-KIC and InnoEnergy programmes. Public awareness on climate change issues is very high, which is essential to support ambitious climate policies. The EU provided information on wider public information campaigns undertaken since the NC6 and results of studies on public opinion. The Eurobarometer 2017 indicated that 92 per cent of EU citizens see climate change as a serious problem and 79 per cent believe that fighting climate change can boost the economy and create jobs.

152. In the course of the review, the ERT formulated the following recommendations for the EU to improve its adherence to the UNFCCC reporting

guidelines on NCs and its reporting of supplementary information under the Kyoto Protocol, namely to improve the completeness of its reporting by:[16]

(a) Providing updated information on how it believes that its PaMs are modifying longer-term GHG emission trends (see table 8, issue 1);

(b) Providing relevant information on factors and activities driving emission trends for each sector (see table 12, issue 1);

(c) Providing the supplementary information on the national registry required by Article 7, paragraph 2, of the Kyoto Protocol (see table 5, issue 1);

(d) Providing information on how it promotes and implements the decisions of ICAO and IMO to limit emissions from aviation and marine bunker fuels (see table 8, issue 4);

(e) Providing the information required by Article 7, paragraph 2, of the Kyoto Protocol in relation to participation in the Kyoto Protocol mechanisms (see table 6, issue 1);

(f) Providing the information required by Article 7, paragraph 2, of the Kyoto Protocol in relation to Article 3, paragraphs 3 and 4 (see table 6, issue 2).

IV. Questions of implementation

153. During the review the ERT assessed the NC7, including the supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol, and reviewed the information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol with regard to timeliness, completeness, transparency and adherence to the UNFCCC reporting guidelines on NCs. No questions of implementation were raised by the ERT during the review.

[16] The recommendations are given in full in the relevant sections of this report.

Annex

Documents and information used during the review

A. Reference documents

2017 GHG inventory submission of the EU. Available at http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/10116.php.

BR3 of the EU. Available at http://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/459381_european_union-nc7-br3-1-nc7_br3_combined_version.pdf.

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"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories". Annex to decision 24/CP.19. Available at http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications". FCCC/CP/1999/7. Available at http://unfccc.int/resource/docs/cop5/07.pdf.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Annex to decision 15/CMP.1. Available at http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf.

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Report on the individual review of the annual submission of the EU submitted in 2016. FCCC/ARR/2016/EU. Available at http://unfccc.int/resource/docs/2017/arr/eu.pdf.

Report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of the EU. FCCC/IRR/2016/EU. Available at http://unfccc.int/resource/docs/2017/arr/eu.pdf.

Report of the technical review of the second biennial report of the EU. FCCC/TRR.2/EU. Available at http://unfccc.int/resource/docs/2016/trr/eu.pdf.

Report on the technical review of the sixth national communication of the EU. FCCC/IDR.6/EU. Available at http://unfccc.int/resource/docs/2014/idr/eu06.pdf.

Revisions to the guidelines for review under Article 8 of the Kyoto Protocol. Annex I to decision 4/CMP.11. Available at http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf.

"UNFCCC biennial reporting guidelines for developed country Parties". Annex I to decision 2/CP.17. Available at http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Ana Danila (European Commission, Directorate-General for Climate Action), including additional material.